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USSR Report

TRANSPORTATION

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MOTOR VEHICLES AND HIGHWAYS

DEPUTY MINISTER ON MOTOR VEHICLE SUPPORT OF HARVEST WORK

Moscow SEL'SKAYA ZHIZN' in Russian 8 Dec 84 p 2

[Interview with RSFSR Deputy Minister of Motor Transport V. D. Medvedev, by SEL'SKAYA ZHIZN' correspondent G. Tarakanov: "Along the Rural Routes"; time and place not given]

[Excerpts] Motor vehicle transport workers are an important factor in the realization of the Food Program. They are reliable partners with the rural workers of the agro-industrial complex. At the request of our correspondent, RSFSR Deputy Minister of Motor Transport V. D. Medvedev talks about how concretely this collaboration is growing.

The degree to which collectives of our enterprises are participating in the affairs of rural workers can be judged by the following facts: Every year at harvest time, the harvests of just the Russian Federation's agriculture industry attract about 700,000 motor vehicles. It is an impressive figure. And it's constantly increasing. By the end of the 11th Five-Year Plan period, volumes of agricultural freight hauled by general-purpose transport are planned to increase by 30 percent in comparison with 1980. For example, fruits and vegetables hauled by our drivers are increasing by 7-10 percent yearly.

The effort being carried out by the ministry and its territorial associations to improve transport service for the agriculture industry complex is showing positive results. However, in addition to general-purpose transport, a large number of vehicles assigned to a number of other ministries and departments is operating in the agricultural field. We believe that in order to improve their performance we need to constantly coordinate the way in which these vehicles are used within the scope of each rayon, oblast or kray, no matter which department the vehicles belong to. This coordination will make possible the improved organization of freight hauling, increased efficiency in vehicle utilization, and reduced outlays for agricultural production.

RSFSR Minavtotrans and its territorial associations have worked out locally what is an extremely effective form of operational management for the motor transport which is brought in at harvest time. It's a question of centralized control, which is inseparable from the intersectoral coordination of efforts. Lately, this has permitted a reduction in the number of vehicles while increasing the overall volume of freight hauled.

In our opinion, control centers should have been organized for year-round use, and not just for harvest time. On recommendations developed by scientific and production organizations of our ministry, such an agency for the year-round administration of motor transport to service the agriculture industry complex, (a regional interdepartmental dispatcher service), has been organized and is operating successfully in the Krymskiy Rayon of Krasnodar Kray. This agency has made it possible to reduce by 25 percent the idle time of vehicles during loading and unloading and to increase their utilization coefficient by 8 percent. The rayon's entire vehicle fleet spends several days a year working on fuel economy. Thus, for several years no outside transport has been brought in for the harvest. On the contrary, they go and help their neighbors.

Unfortunately, for the time being the agricultural motor vehicle fleet is specialized to a small degree, and this inevitably leads to a reduction in the efficiency of its use. For the most part, standard-purpose side board and dump trucks are delivered to rural areas. And there's a constant shortage of refrigerated vehicles of varying load-carrying capacities for perishable agricultural products and tank trucks for hauling milk, live fish, ammonia water and other liquid fertilizers. There are practically no self-loading agricultural vehicles being produced. There is a great need in intraorganizational transport on kolkhozes and sovkhozes for medium-tonnage vehicles with removable bodies and increased load-carrying capacity, as well as for vehicles with increased cross-country capability, equipped with mounted equipment devices.

It seems to be time for our motor vehicle industry to begin supplying rural transport equipment with standardized devices which will allow rapid re-equipment of the vehicles so that they can be used for varying organizational needs. It will put no special strain on the design concept to work out light-weight expanded-metal screens which will increase the trucks' bed-size, and the outlay for metal will more than pay for itself in savings of timber, labor and time.

The state of affairs for containers is about the same as for mounted equipment. The advantage in using containers is well known. However, because of shortages of this equipment, the volumes of potatoes, fruit and vegetables hauled in containers amounts to a total of only 0.3-0.5 percent of overall volumes.

It seems that solving all these long-range problems will bring about a great improvement in the provision of transport for kolkhozes and sovkhozes, and will raise the level of efficiency in the utilization of trucks on the rural routes.

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MOTOR VEHICLES AND HIGHWAYS

GENERAL DIRECTOR ON BELAVTOMAZ WORKS MODERNIZATION

Moscow EKONOMICHESKAYA GAZETA in Russian No 47, Nov 84 p 17

[Article by BelavtoMAZ General Director Mikhail Fedorovich Lavrinovich: "To the Farthest Frontiers of Scientific and Technical Progress"]

[Excerpt] Over 30 motor vehicle modifications, having carrying capacities of from 8 to 180 tons, as well as a variety of trailers and semi-trailers, are coming off the BelavtoMAZ [an association which includes the BelAZ, MAZ and MoAZ Works] conveyors. During the 11th Five Year Plan period, this association collective has been awarded the Challenge Red Banner three times by the CPSU Central Committee and the USSR Council of Ministers, the AUCCTU [All-Union Central Trade Union Council] and the VLKSM [All-Union Lenin Communist Youth Union] Central Committee. Mikhail Fedorovich Lavrinovich discusses the way in which problems are being solved to improve motor vehicle equipment in the Association.

He has worked in the motor vehicle industry since 1950. While working as a trouble-shooter, he graduated from the automotive tekhnikum, and then from evening classes at the Belorussian Polytechnical Institute. He has been a foreman, shop supervisor and chief engineer of the motor vehicle plant, and technical director of the Association. Since 1982 he has been the Association's general director.

As it says in the Basic Directions for the Economic and Social Development of the USSR for 1981-1985 and for the period up to 1990: "To initiate production of new, highly efficient, very high-capacity dump trucks for open-pit work...." In order for this problem to be solved, the plant had to be rebuilt, and the motor vehicle workers at the Zhodino plant and of the entire association had to work strenuously.

ON THE LEVEL OF THE BEST MODELS

The majority of vehicles produced by BelavtoMAZ are now being exhibited at the Avtoprom-84 Anniversary Exhibition, which was opened in honor of the 60th anniversary of Soviet motor vehicle construction. Vehicles from the MAZ-6422

Series are getting a lot of attention from exhibition visitors. And this is no accident: these models meet the requirements of present-day international and domestic standards. The designers succeeded in achieving excellent maneuverability and stability, and have provided a high degree of reliability in all of the fundamentally new assemblies.

In the spacious cabin with its panoramic windshield, maximum comfort has been created for the driver's work and relaxation. The cab interior, with its soft pastel upholstery, its efficient ventilation and heating system, the soft cushioned seat, radio, cooler, sleeper and other conveniences, is built in accordance with human engineering requirements, and reduces driver fatigue, making long hauls possible.

UNITED WITH SCIENCE

The establishment of motor-vehicle and trailer technology on an equal footing with the best of the world's models is unthinkable without a close relationship between production and science. The association has a solid scientific base at its disposal, which is made up of a number of scientific and technological subdivisions, four experimental shops and almost twenty scientific research laboratories. In just the main enterprise, there are over 500 specialists who directly participate in carrying out scientific research work.

But in present-day conditions, even having a major scientific research facility, it is impossible, using only in-house personnel, to solve the problems involved in accelerating scientific and technical progress. That is why the association is directing its efforts toward expanding the degree of collaboration with other scientific and research organizations.

Whereas collaboration involved working with 500 institutes in 1975, at present this number is approaching 800. According to the economic agreements on the association's needs, scientific research and experimental designing work to the tune of R2,500,000 is carried out by these institutes. Each ruble spent to complete scientific developments produces an effect of over two rubles.

Using the strengthening of the creative bonds with science as a base, a movement has been organizationally set up within BelavtoMAZ during this five-year plan under the motto "Science and Production Joined Together to Give Every Product the Highest Quality in Its Development and Manufacture. The movement is widespread in the other enterprises in Minsk.

"The Pact of 6" holds a special place regarding improvements in the quality, reliability and service life of the products manufactured here. Collectives of the Minsk Motor Vehicle Plant, the Avtodizel' and Dizel'apparatura Production Associations, NAMI [Central Motor Vehicle and Engine Scientific Research Institute], MADI [Moscow Motor Vehicle-Highway Institute] and the first motor vehicle combine of Glavmosavtotrans have successfully collaborated within the framework of this contract for two decades.

This union of science with production is producing excellent results. The efficiency in the utilization of motor vehicle transport in the national economy has increased markedly. The reserve, prior to major overhaul, of MAZ vehicles equipped with YaMZ diesel engines, has increased 1.7-fold.

The increasing degree to which the Association's plants are equipped technically from year to year is a result of the collaboration of science and production. There are about 2,500 automatic and semiautomatic machines, transfer machines and special-purpose machines numbered in the shops of its enterprises.

The economic effect resulting from reducing the prime cost of the Association's output thanks to the introduction of new equipment and means of mechanizing and automating production, progressive materials and advanced production techniques has, during the three and a half years of this five-year plan period, exceeded 20,000,000 rubles. More and more of the production methods are being carried out through the use of machines equipped with numerical program control, and progressive production methods are being widely implemented. Among them are: finishing of components by the plastic deformation method, vacuum-plasma spraying of the metal-cutting tool, low-waste hot-forming, the powder metallurgy method of component manufacturing, low- and high-pressure forging of aluminum alloys, and many others.

But the problem of improving the quality of the finished product in any given instance in motor vehicle technology often extends beyond the framework of the association. Thus, we are connected to our partners by thousands of threads, our partners being the people who supply the lots of products, assemblies and materials.

It is pleasant to mention that our allies--the metallurgical plants--have made marked improvements in the fulfilling of their delivery contracts this year.

We are awaiting aid and are hoping for mutual understanding on the part of Minneftekhimprom [Ministry of the Petroleum Refining and Petrochemical Industry] enterprises. We are counting on them to develop and initiate production of new and more efficient tires, wheels, cups and hoses.

We are hoping that Minelektrotekhprom [Ministry of the Electrical Equipment Industry] will speed up production of storage batteries, which will insure that engines start up at low temperatures. We also need the new modern and powerful YaMZ-8421 diesel engines from the Yaroslavl Engine Works.

THE ROLE OF THE ECONOMIC SERVICES

The creation and development of new equipment is not only an engineering problem, but also an economic problem. It cannot be solved without an improvement in the economic mechanism, and a strengthening of the role played by the economic services in the business of improving production effectiveness.

In my opinion, the active influence of the economic services in speeding up scientific and technical progress is one of the most important tasks in their

work. I consider it intolerable, when the role of distinctive guide for the introduction of new equipment is diverted to the economists. The basis of their work is constant analysis, the results of which uncover reserves in the improvement of production efficiency, in planning and in the intra-economy mechanism.

And it is with special regret that I must talk about the fact that we, the executives, are not always able, by ourselves, to organize a strong economic service. The reasons are varied, but one, it appears, is typical: this is the very first subdivision to suffer when management personnel are reduced in force.

Quite a lot has already been written and said about the notorious division of workers into AUP and non-AUP [management] personnel. I have not encountered, in print, a single article, paragraph or opinion in defense of this partition, or which elucidates the need for it, or its advisability. But it exists.

It seems to be advisable to fix norms for the production personnel work strength without dividing up the management personnel by a single stroke of the pen. To a large extent, the yearly reduction in management personnel undermines our chances to improve the economic mechanism. We just hope that in the future, the transition to conditions of large-scale experimentation, and a real expansion of rights in the implementation of a personnel policy will relieve the acuity of the problem.

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MOTOR VEHICLES AND HIGHWAYS

VAZ SPARE PARTS SUPPLY, DISTRIBUTION SYSTEM SCORED

Moscow SOVETSKAYA ROSSIYA in Russian 10 Nov 84 p 1

[Article by T. Solunina, candidate of economic sciences, Kuybyshev: "Supply Base", under the rubric "A Letter on an Important Topic"]

[Text] Which of an enterprise's services is most essential? These days a lot of people will say the supply and sales department. Some small, even insignificant part does not get delivered to the assembly lines on time, and the entire operation starts working with interruptions, and then the whole thing shuts down. The efficiency with which the conveyors at the Volga Motor Vehicle Works work is well known. Gratitude for this ideal operational rhythm should be addressed, to a great extent, to the suppliers who deal with hundreds of plant-suppliers.

But not only does the Volga Motor Vehicle Works [VAZ] manufacture motor vehicles, but has also set up its own all-union network of car-care centers, which requires many millions of rubles' worth of spare parts every year. Who else but this very firm has needed its own large in-house supply base from the very beginning to control the flow of spare parts around to the motor vehicle centers and technical servicing stations? But up to now the association has had practically no such bases. This is one of the main reasons for the poor operation of the car-care centers. The plant is forced to send out spare parts of the same type packed in containers. There are no less than 20 tons of spare parts in each container, even though no more than 200-300 kilograms in all are needed. Scarce parts, which are in short supply at all the car-care centers, leave the plant in shipments of this same huge size.

The motor vehicle builders are pinning their hopes on a recently set up organization, the Avtozapchast' [Automotive Spare Parts] Association, to solve this acute problem once and for all. One central, and 150 regional warehouses will make up this association.

But what is to be done, in a similar situation, for enterprises which are a little bit smaller, or for the really "pygmy-sized" enterprises? Here, the departmental approach, which representatives from various sectors occasionally support in public, is evidently unsuitable. All the more so, since experience in concentrating material resources in large regional warehouse complexes already exists. We are referring to the centralized enterprises of USSR Gosnab

and RSFSR Gossnab. In Kuybyshev Oblast, for example, their total share of the total number of supply enterprises amounts to 11 percent. But on the other hand, each of their enterprises realizes a yearly output which is five times greater than that of the departmental supply bases. The remaining turnover of material assets is the portion accounted for by the ministerial and departmental organizations.

The advantage of large supply bases is obvious. Highly-mechanized warehouse complexes provide considerably faster loading and unloading, and far more effective utilization of equipment. Moreover, in Kuybyshev Oblast 12 of the departmental supply organizations have no warehouse equipment at all, and the rest of them have to make do with only a fifth of the equipment. It's not surprising that labor productivity here is 4-fold lower than for Gossnab enterprises. And there can only be one path to reorganization: a major reduction in departmental supply organizations and a concentration of material and technical resources in large territorial bases. Calculations show that the potential of Gossnab warehouses is not being fully utilized. Increasing the goods stacked in one single square meter of space up to the norm, in only RSFSR Gossnab bases, will increase labor productivity 3-fold. This would be enough, for example, to process the entire freight turnover of RSFSR Minzhilkomkhov [Ministry of Housing and Municipal Services] and RSFSR Mintorg [Ministry of Trade] supply organizations. Also, there is a very real possibility of transferring supply organizations from the construction ministries over to USSR Gossnab. This centralization will simultaneously solve the acute problem of the shortage in warehouse space. But the main thing is that it will speed up the rate of turnover of commodity stocks.

To a great extent, concentrating and specializing supply bases and warehouses will increase their share of direct and long-range operational connections, and will promote a successful solution to one of the most important problems associated with intensifying the national economy.

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MOTOR VEHICLES AND HIGHWAYS

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BEARING INDUSTRY'S ROLE IN MOTOR VEHICLE PRODUCTION

Moscow AVTOMOBIL'NAYA PROMYSHLENNOST' in Russian No 10, Oct 84 pp 28-29

[Article by B. G. Shakhnazarov of VPO Soyuzpodshipnik: "The Main and Sole Supplier of Ball Bearings"]

[Excerpts] The bearing industry is a comparatively young sub-sector of the motor vehicle industry--in 1982 it was about 50 years old but it is the largest specialized association having a complex of modern enterprises with a high level of mechanization and automation as well as scientific and planning organizations. This complex supplies its products not only to the main bearing customers--the motor vehicle industry and agricultural and tractor machine building plants, but also all other sectors of the national economy: instrument building, machine tool building, railroad transportation, aviation industry, etc.

The total products list of manufactured bearings is now more than 20,000 sizes including 12,000 ball bearings with an outer diameter of 2-3500 mm and weighing from a fraction of a gram to six tons; their yearly production volume is around one billion pieces.

At all stages in the growth of the domestic motor vehicle industry, the complete machine units and assemblies for motor vehicle transportation means were accomplished through domestically-produced ball bearings alone. This has become a fine tradition. Therefore, it was natural that with the construction of the motor vehicle giants--VAZ/Volga Motor Vehicle Works/ and KamAZ/Kama Motor Vehicle Works/--and the development of a range of modern passenger vehicle and truck models, there was a requirement to make new types of bearings of various designs with the provision of increased technical requirements for preciseness in machining raceways and rolling centers, rotation ease, and vibration level. The problem was solved--in a short period of time about 50 types of such bearings were created. In general, it is impossible to ignore the fact that today the bearing industry fully meets the demand of motor vehicle plants for high-quality ball bearings whose durability satisfies prescribed motor vehicle mileage standards and the technical level matches the best of similar foreign products. The results of the International Specialized Exhibition "Podshipniki-81," which was held in Moscow, attest, in particular, to this.

However, the demand for bearings is growing. Thus, an analysis of recent tendencies in machine building and instrument building development shows that in the 11th Five-Year Plan the full satisfaction of the needs of the national economy for ball bearings can and must be achieved not only through an increase in the production volumes of their existing designs but also through an increase in quality, a sharp broadening of the manufactured products list, especially bearings of progressive design as well as changes to the output structure within the main design groups. In addition, now that a premium is being put on quality indicators, it is impossible to raise them only by constructing new plants. The technical retooling of the sub-sector is more important here. Just the introduction of new progressive equipment will permit an increase not only in machining preciseness and quality and, as a result, an increase in the life of bearings and a lowering of their level of vibration, but also a significant decrease in metal loss (because of an approximation of the shape of the stampings to the shape of the finished parts and a lowering of the allowances for mechanical machining). The full technical retooling of initial processing and heat treatment shops and lathe and grinding-finishing machining shops will increase the metal usage coefficient, on the average, by 20 percent and will permit a savings of about 140,000 tons of expensive and complicated (for metallurgical production) alloy ball-bearing steel.

Technical retooling also makes it possible to solve yet another most important problem--a growth in bearing output without increasing the number of workers. The basic direction here is the mechanization and automation of labor-intensive operations. Thus, for example, the introduction of domestic automated and mechanized production lines for producing stampings will permit an almost six-fold increase in productivity; one such line frees up to 35 people and saves annually 400 tons of metal because of the decrease in mechanical machining allowances. As a second example one can cite the automation of the grinding-finishing machining of raceways and the assembly of bearings on automated lines developed by VNIPP/All-Union Scientific Research, Design and Technological Institute of the Bearing Industry/: one such line frees 25 industrial production personnel, raises raceway machining preciseness by 1-2 grades, and saves a great deal of production space.

One of the important work directions in the 11th Five-Year Plan is the development and introduction of new manufacturing processes for producing bearings. In the first place, these are processes aimed at saving metal; semi-hot volume stamping on multi-position presses and cold rolling of ball-bearing raceways which raise the coefficient of metal use by 25-30 percent; cold stamping rollers also permitting an increase of this coefficient by 25 percent; stamping needle-shaped bearing separators, then welding doubles it. In the second place, these are the processes directed at increasing the productivity and quality of manufactured bearings: the further introduction of concentrated methods for lathe machining of a tube blank on multispindle automatic machines (an automatic machine productivity growth of up to 60 percent); the high-speed grinding (60-80 meters per second) with forced cross-feeds, as well as the combined and simultaneous grinding of several surfaces.

Work is being conducted on making and introducing new progressive processes--such as the precision rolling of ball-bearing raceway blanks, obtaining raceway blanks by stamping and post-welding, manufacturing blanks and parts by the powder metallurgy method.

The accomplishment of the bearing industry's technical retooling program presupposes the development in every possible way of its own facility for manufacturing narrowly-specialized equipment for the individual manufacturing operations and processes. Bearing plants have already mastered the manufacture of many progressive types of equipment such as special multi-position presses for making separators, mills for the hot rolling and rotor lines for the cold stamping of raceway blanks, lathe multispindle automatic machines, multiblade and touch-up turning lathes, high-speed electric and belt spindles, special grinding and finishing machines, control and measurement and assembling automatic machines, mechanical machining automated lines as well as lines for assembly, inspection, conservation and packing. (For example, the development of the machine tool industry on the GPZ-4 alone has permitted this industry to outfit up to 30 percent of the manufacturing equipment stock with machine tools of its own production).

As has already been mentioned, the sub-sector is systematically working on increasing the quality of the manufactured products. The direction in this work, including for the long-term, has been clearly determined--the improvement of existing, including series-introduced, bearing designs by optimizing their internal geometry, the use of high-quality steels and alloys, the wide use of non-metallic materials for separators, and also the development of new lubricants; the creation of fundamentally new progressive bearing designs by using modern research and test equipment and computers.

Thus, in 1985 the plan is to manufacture about half of the ball bearings in a shielded design; 86 percent of the spherical double-row roller bearings will be made from symmetrical rollers which increases their carrying capacity on the average by 15 percent and their longevity by 150-200 percent.

The new designs include linear displacement ball bearings, large-size multi-serial cylindrical roller bearings, ball bearings with two-way sealing and a square opening, thrust roller bearings with cylindrical and taper rollers, special-design bearings for a new family of front-wheel drive passenger cars, etc. Bearings for working with large dynamic loads with increased temperatures up to 720 K and in serial media and also flexible ball bearings for wave transmissions and bearings with moment of friction automatic compensation have been developed and have been put into production.

The basic directions in the area of developing new and improving operating manufacturing processes for the lathe machining of bearing parts in this five-year plan are increasing lathe productivity and machining precision, saving metals and other material resources, lowering the operational costs for the cutting tool and equipment accessories, introducing new automatic and semiautomatic lathes, creating specialized sectors of ChPU/numerical control/ machines for machining small-series product list bearing parts, and introducing effective means on which to base stampings and cutting tools with improved operational properties.

Special importance in the manufacturing process belongs to grinding and finishing machining which is very labor-intensive and determines bearing quality to a significant degree. To improve grinding and finishing machining it is planned to increase geometric precision and, first of all, to decrease up to 2-2.5-fold the geometric form defects of bearing part working surfaces.

Work is being conducted in the sub-sector on creating flexible resetable complexes and robotized manufacturing complexes. About 40 robotized manufacturing complexes have now been introduced. The plan is to introduce another 120 by the end of the five-year plan. The use of such complexes will permit the mechanization of labor-intensive operations and will liberate workers from monotonous labor.

The further improvement of the Soviet bearing industry is significantly influencing not only domestic machine building but also the development of the bearing industry in other countries--the CEMA members, where the international OSPP/bearing industry cooperation organization/ has been in operation for more than 20 years, coordinating the development of the industry and the trade in bearings. Thanks to such cooperation, the manufacture of bearings in countries associated with the OSPP is systematically growing and amounts to more than 25 percent of the world production of ball bearings.

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MOTOR VEHICLES AND HIGHWAYS

HISTORY OF MOTOR VEHICLE DIESEL ENGINE DEVELOPMENT

Moscow AVTOMOBIL'NAYA PROMYSHLENNOST' in Russian No 10, Oct 84 pp 16-18

[Article by N.S. Khanin, doctor of technical sciences, NAMI [Central Motor Vehicle and Engine Scientific Research Institute] and L.A. Glamazdin, Yaroslavl Engine Works: "Four Generations of Soviet Motor Vehicle Diesel Engines"]

[Excerpt] Continuing their fruitful work on the perfection of the second generation, the YaMZ [Yaroslavl Engine Works] collective prepared to solve the problems of developing the motor vehicle diesels of the next generation. As a result, designs were developed (fig. 1) for the diesels of the third generation (the KamAZ-740 type), the mass production of which was organized at KamAZ [Kama Motor Vehicle Works] with the active participation of YaMZ.

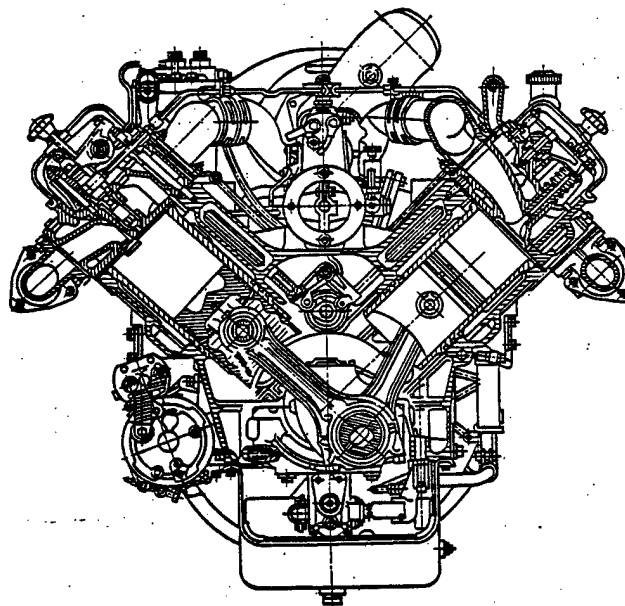


Рис. 1

Fig. 1

Characteristic features of the third generation of diesels are: light weight; compactness, thanks to which a light load on the vehicle's axles is assured; a high degree of reliability; fuel economy; lifetime, which is guaranteed by increasing the frequency of revolutions of the crankshaft to 2600 per minute and the piston speed to 10.4 meters per second; and the broad application of aluminum alloys (instead of cast iron) in the design. Among the advanced solutions used in the KamAZ-740 diesel, the following should also be noted: individual cylinder heads with steel gaskets on the gas joint; pistons with non-resisting inserts for the upper piston rings; a set of three piston rings; automatic, hydraulically controlled coupling for the fan drive; full-flow oil cleaning in filters with paper elements combined with a partial-flow centrifuge; high-efficiency air and fuel filters with cardboard filtering elements; a "thermostart" device which, together with a powerful starter equipped with the "positorque" switching system and a PZhD [expansion unknown] pre-ignition heating device, guarantees KamAZ diesels good starting qualities.

Organizing and developing the production of KamAZ diesels, with which not only the complex's vehicles are put together, but also Ural and ZIL-133GYa vehicles and a number of buses, the collective continues to work on perfecting manufacturing technology as well as the designs of the diesels themselves. In particular, it has recently succeeded in increasing the hardness and durability of the cylinder block, using a separating (protective) device in the cavities of the crankshaft crankpins and flat-dished (instead of convex) push-rods, moving the air cleaner to the vehicle's engine compartment, improving the centrifuge, and still further reducing the smokiness of exhaust gases and specific fuel consumption. However, the work continues. It is connected primarily with assimilating diesel models with increased energy indicators (an eight-cylinder with turbocharger, and a ten-cylinder mostly with turbocharger) and establishing the production of turbo-compressors.

As a technical mission for the KAZ [Kutaisi Motor Vehicle Works] engine for agricultural vehicles from the Kutaisi Motor Vehicle Works imeni G.K. Ordzhonikidze, it was stipulated that a model be developed that was a maximally unified with the KamAZ-740, light (600 kilograms) six-cylinder model with a nominal capacity of 113 kilowatts (without supercharger, and up to 150 kilowatts with a turbocharger). This problem was successfully solved. And production of the KAZ-642 engine began at the Kutaisi Motor Vehicle Works in 1983.

The advanced solutions worked out during the development of the third generation diesels and a number of improved elements in design and technology were extended to diesels of the second generation, facilitating an increase in the operational qualities of the latter. For example, cardboard air, fuel, and full-flow oil filters are now used on them, as are starter drive and electric glow plugs for ease in starting; the locking of bolts on the covers of connecting-rod big ends has been eliminated; individual cylinder heads and steel gaskets on the gas joints have been introduced; and unified turbocompressors are used.

At YaMZ, work has long been underway on the development of a new, fourth generation of motor vehicle diesels (YaMZ-840) for vehicles with a large load-carrying capacity and for Kirovets tractors. Their cylinder diameter is increased to 140 millimeters and the working volume of a cylinder is also increased (up to 2160 cubic centimeters per cylinder), which improves their energy indicators and life.

In developing the YaMZ-840 diesel, they basically managed to solve the problem of resource development before the start of large-lot production; this was facilitated by the formation, at the Avtodizel' Production Association, of a shop designed for small-lot production of diesels with turbocharger, primarily with high cooling of charged air. In the same way the leading tendency in world diesel construction was taken into consideration--the transfer to wide use of a turbocharger, increasing its level, and increasing the average effective pressure with a simultaneous increase in reliability.

Alongside the measures instituted in diesels of the preceeding generations, such progressive solutions were provided for in the design of the YaMZ-840 diesels as the use of four (two intake and two exhaust) valves for each cylinder, which reduces the energy expended on piston motion; the use of pistons with head-end oil cooling for the more speeded-up models; built-in water-oil radiators and coolers for supercharged air; modern turbocompressors with increased efficiency and reduced diameters of the impellers; high-strength nitrided crankshafts without galleys in the crankpins; fuel apparatus with high-pressure pumps, which provide a significant increase in the energy of fuel atomization.

The assimilation of the enumerated design solutions in light of the advanced technology which will be introduced at the Tutayev Diesel Assembly Works of the Avtodizel' PO [Production Association] and in the expanding production of the Dizel'apparatura PO, will allow an increase in the level of technology and an increase in the cylinder power of the YaMZ diesels, bringing it, for vehicles already at the first stage of organization, to 36, and for tractors, to 30 kilowatts per cylinder, and will also make possible a decrease in the specific consumption of fuel to the levels of the best analogs, that is less than 215 grams per kilowatt hour.

The series of solutions discovered in the development of diesels of the fourth generation are being applied to engines of preceeding generations as well.

The YaMZ collective, which has a tradition of designing large-capacity vehicles and which has developed the production of modern transmissions and clutches for diesel power assemblies, is actively working on the perfection of the combination of vehicle and engine. Apart from the study of their operation and studies to measure performance, a great deal of attention is paid here to the optimization of the engines' characteristics, as well as to the optimization of a number of gear ratios and transmissions, with the goal of increasing the fuel economy of the vehicles.

Soviet motor vehicle diesels have a low cost (for 1 kilowatt of power), but they are very reliable. There are several reasons for this: a finely tuned system of operational, input, and delivery controls, the institution of statistical methods of analysis, and the operational acquisition of information from the consumer enterprises. A most important role in increasing the technical level and the quality of diesels is also played by the effective creative cooperation of diesel engineers with the enterprises manufacturing the component parts, primarily with the Dizel'apparatura PO.

A good example is the cooperation with asbestos industry enterprises, as a result of which a new composition of resilient material, "PND", was introduced for

cylinder head gaskets. The work that was conducted allowed not only an increase in the energy indicators and life of the engines, improvement in their fuel economy, reduction in oil consumption by more than two-fold, and reduction in the smokiness of exhaust gases and the labor input of operation, but also ease in starting at low temperatures and an increase in the consumer qualities of diesels.

Everything covered above can be illustrated with the following data. Thus, if we compare diesels of the first and fourth generations, we will see that the greatest nominal power and life of the latter increased by a factor of six, the specific weight was reduced by a factor of two, and oil consumption by a factor of three. At the same time, minimal specific fuel consumption was reduced by only 25 percent, since the indicated efficiency of the diesels had already come close to what was theoretically possible. But there are resources here too--they are in increasing mechanical efficiency. Besides this, in recent years concepts have been worked out to perfect operation by means of reducing the share of air that is inactively used for combustion in the junction zones of pistons with cylinders and their heads as well as energy losses in gas exchange; increasing the energy of fuel atomization; and perfecting the structure of the vortex motion of the charge. Primary attention is paid to perfecting and improving the efficiency of the turbocharger system. Characteristic parameters for motor vehicle diesels of the four generations are cited in the table.

Engine Models	Number		Capacity, kilowatts		Use of Supercharger
	cylinders	strokes per cycle	nominal	cylinder	
YaAZ-204, YaAZ-206	4; 6	First generation 2	80.8; 121	20.2	positive-displacement blower
YaAZ-M204 YaAZ-M206*	4; 6	2	93.4; 138**	23.3	same
YaMZ-236, YaMZ-238	6; 8	Second generation 4	132; 146.5	22	no supercharger
YaMZ-240	12	4	264.7	22	same
YaMZ-240N, YaMZ-238N	12; 8	4	368; 235	30.6; 29.4	average supercharger
YaMZ-238P, YaMZ-238F*	8	4	213; 235	26.6; 29.4	low, average supercharger
KamAZ-740	8	Third generation 4	154.4	19.2	no supercharger
KamAZ-7403	8	4	191.2	23.9	low supercharger
KamAZ-741	10	4	191.2	19.2	no supercharger
KamAZ-7411	10	4	235	23.5	low supercharger
KAZ-642, KAZ-6421	6	4	112.5; 132.7	18.7; 23.2	no supercharger low supercharger
YaMZ-8401	12	Fourth generation 4	478	39.8	supercharger w/ air cooling
YaMZ-8421	8	4	265	33.12	supercharger

* Modernized model

** Speeded-up model (with reduced life)

In summarizing the experience of increasing the technical level of Soviet motor vehicle diesels, it can be said that many factors played a positive role. They include the use of the most progressive trends and solutions in world diesel engineering; the combination of design and technological developments with operational ones; the comprehensive study of diesel operating experience with the provision of effective feedback to the industry; the establishment and development in the industry of experiment on diesels and their elements, and the use of it to develop engines primarily before the start of mass production; the development and institution of a family of unified engines with various energy indicators; the cooperation of the industry with branch science, primarily with NAMI, in estimating potential and developing research methods; the complex development of diesel power assemblies as part of the vehicle; the creative cooperation between diesel engineers and the manufacturers of component parts; and systematic work on the modernization of the design and manufacturing technology of engines of the previous generations with the use of advanced solutions that were worked out in the development of subsequent ones.

The structure of engineering work that has been laid down over the period of development of motor vehicle diesel engineering, its material base, and increased cadres give a basis for counting on the further intensification of technological progress in the field of motor vehicle diesel technology in our country.

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MOTOR VEHICLES AND HIGHWAYS

GASOLINE-POWERED ENGINE DEVELOPMENT STATUS

Moscow AVTOMOBIL'NAYA PROMYSHLENNOST' in Russian No 10, Oct 84 pp 13-15

[Article by B.I. Prudnikov and S.S. Istomin, Ministry of Motor Vehicle Industry: "Gasoline-Powered Motor Vehicle Engines. Results and Potential of Development"]

[Excerpt] The end of the 1960's and beginning of the 1970's was characterized by significant growth in the production of passenger cars and by qualitative changes in their indicators. The reconstruction of the AZLK [Lenin Komsomol Motor Vehicle Works], ZAZ [Zaporozhye Motor Vehicle Works], and others was conducted during this period; they began to switch over to the production of new models of vehicles. In connection with this, engines were modernized as well. Thus the capacity of engines from the Melitopol Engine Plant was increased to 30 kilowatts. Production was begun of an essentially new model for the AZLK Moskvich-412, in which, for the first time in domestic engine-building, an overhead camshaft was used. On it the power per liter of displacement, for the first time in the country, reached 37 kilowatts. A new ZMZ-24 engine with a capacity of 70 kilowatts was developed for GAZ-24 Volga passenger cars as well. The Ulyanovsk Motor Works also began production of their own new motor vehicle engines. In 1970 the giant of passenger car construction, the Volga Motor Vehicle Works imeni 50 years of the USSR, was put into operation. Production of the VAZ [Volga Motor Vehicle Works] family of engines, with capacities from 45 to 60 kilowatts, was begun.

One of the motor vehicle industry's most important tasks for the 11th Five-Year Plan is to economize on material resources wherever possible, in the first place by reducing fuel consumption by motor vehicles. Its solution depends in large part on the technical level of engines. It is for exactly this reason that it is stipulated that by 1985 the fuel consumption of gasoline-powered vehicles be reduced by 6-20 grams per kilowatt hour in comparison with 1980, and oil consumption by 0.1-0.3 percent of the fuel consumption. In this way the life of the engines will increase by 30-75,000 kilometers. The improvement in the engines' indicators will be achieved by means of adopting more efficient operating processes, just as by perfecting the design of assemblies and parts and reducing mechanical losses.

In terms of the trends enumerated, much has already been done, and much is being done. Thus, on the engines of the Zavolzhye Engine Plant an operation was introduced in 1983-1984 with vortex motion of the intake, which increased its

fuel economy by 5-7 percent. A similar process will be adopted on ZIL-130 and AZLK engines as well. The same purpose is served by the organization of lot production of prechamber-flare engines for GAZ-3102 Volga passenger cars.

Electronic systems for controlling the processes of ignition and mixing are opening up new possibilities for the improvement of the indicators of gas-powered engines.

Along with the improvement of the gas-powered engines currently being produced, there are plans in the branch to change radically the structure of their production, having increased the number that operate on gaseous fuel. For example, lot production is already under way of truck engines that operate on liquefied butane-propane and compressed natural gas, and in the 12th Five-Year Plan their production will increase substantially. Work is being conducted on the use of compressed natural gas in buses and passenger cars, as well as other types of alternate fuel, primarily methanol in its pure form as well as in a mix with gasoline, for all types of motor vehicle transport. In particular, at the present time about 300 ZIL [Motor Vehicle Works imeni Likhachev] and GAZ [Gorkiy Motor Vehicle Works] vehicles are operating on gas-methanol mixes. Besides this, studies have been begun on the use of the products of the decomposition of methanol, synthetic fuels, and mixtures of gasoline with hydrogen and pure hydrogen as motor fuels.

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MOTOR VEHICLES AND HIGHWAYS

CHIEF DESIGNER ON FEATURES OF NEW VAZ-2108 LADA

Moscow ZA RULEM in Russian No 11, Nov 84, No 12, Dec 84

[Article by Georgiy Konstantinovich Mirzoyev, chief designer at the Volga Motor Vehicle Works imeni 50 years of the USSR (VAZ): "Front-Wheel Drive Lada"]

[No 11, Nov 84 pp 6-7]

[Text] The appearance of a new car for the motorist is always an event. It acquires particular significance if it expresses a qualitative leap in the development of technology. It is in exactly this way that the debut of the first domestic front-wheel drive vehicle, the Lada VAZ-2108, is presented to us. It falls in the year when the sector is celebrating its 60th anniversary, and in the development of domestic automobile engineering this model plays the same kind of role as the VAZ-2101 did in its time. Georgiy Konstantinovich Mirzoyev, chief designer of the Volga Motor Vehicle Works imeni 50 years of the USSR, will acquaint readers with the newcomer.

In the true sense, the VAZ-2108 is not simply a new car, but the first model in a principally new family of vehicles in terms of design. In 1978, when the technical assignment for it was approved, preference was given to the lay-out plan with front-wheel drive. Its merit had long attracted designers, but mass transition to vehicles with such a plan began only in the middle of the 1970's. Even under the conditions of the road network that exists in Western Europe, its dissemination was delayed because of insufficient development of the design and technology of wheel-drive assemblies, steering, and suspension of the power-generating set. At VAZ the organization of production of vehicles with a front-wheel drive lay-out was based on a comprehensive analysis of technical and technological opportunities, generalization of the operating experience of such vehicles, and a complex evaluation of the economic advantage of the transition to a new plan.

At the modern level of technological development a lay-out with a transverse power-generating set and front-wheel drive allows a small passenger car to be made more compact and lighter (ZA RULEM, 1982, No 2). Thanks to this it is possible to utilize space more efficiently in the vehicle, increase the vehicle's maneuverability and cross-country capabilities on roads with a slippery covering, eliminate skidding resulting from wheel-spin (ZA RULEM, 1984, Nos 7 and 8), and also provide a high level of passive safety in any collision and a low level of noise and vibration.

Based on this type of lay-out, specialists from our plant developed a family of front-wheel drive vehicles (ZA RULEM, 1984, No 1). The production of its first model, the VAZ-2108, is already beginning this year. The new technical and technological solutions embodied in this car are called upon to provide a complex of consumer qualities that define the modern passenger car. We will examine them in more detail considering the example of the very first representative of the family. The reader will become acquainted with subsequent models and modifications as these vehicles are assimilated in production.

Comfort. Compared with the plant's previous models, the VAZ-2108 has a more spacious interior. It is 60 millimeters longer, although the overall length of the vehicle has been reduced by 120 millimeters. Besides this, the gear-box housing, which occupied significant space in the leg area, has disappeared and the size of the tunnel on the floor has been reduced--the result of the switch to the new lay-out plan. The overall width of the car has not changed, however, thanks to the flexible side windows, the width of the interior at shoulder level has grown perceptibly.

The increase in the internal volume of the body did not make the vehicle heavier. On the contrary, in comparison with the VAZ-2105 its weight was reduced by 100 kilograms.

The VAZ-2108 became the first Soviet car with a three-door hatchback body, which combines universality of the freight-passenger compartment with an integral and dynamic form characteristic of a sports car. The front-wheel drive lay-out allows its merits to be more completely realized; in this case the floor in the interior and trunk can be situated low enough.

The hatchback body easily transforms from the passenger to the freight-passenger variant. The baggage compartment is separated from the passenger compartment by a folding shelf that rises on opening the back door. To transport large baggage or freight, the back seats can be folded down. Note that, although the new car is shorter than its predecessor and the length of the passenger compartment has grown, the baggage compartment did not suffer, and assumed a more convenient form for the accommodation of baggage.

The new heating system and fans are not only 2.5 times more productive than the previous ones. They supply air simultaneously to several points in the passenger compartment, including the leg area for passengers in the back, and evenly warm up the entire interior and its windows. Among other elements exerting a substantial influence on the improvement of comfort are the anatomically designed front seats with headrests and a mechanism for stepless adjustment of the tilt of the back. With longitudinal adjustment of the headrest, it is simultaneously raised a bit and turned along the horizontal. As a result, it is always possible to find an adjustment where the seating is most comfortable.

The development of such seats is one of the elements of a program directed toward the achievement of the best ergonomic properties in the driver's working area. The relative position of levers, buttons, pedals, steering wheel, and instruments is determined by this assignment--to create the most comfort for driving. For example, the form and trajectory of the pedals were chosen so as not to create difficulty operating them in any shoes, including high heels.

On the whole the vehicle has become more comfortable to ride in, light and responsive in the hands of the driver, with improved visibility and a reduced (in comparison with the VAZ-2105 at 7 decibels) noise level in the passenger compartment.

Operational indicators. Reduced weight in comparison with the VAZ-2105, an engine with sufficient power supply, and good aerodynamics provide the VAZ-2108 with high speed and acceleration characteristics. The guarantee of their reliable realization in operation is the perceptibly better handling of the vehicle on the road--a result not only of the application of front-wheel drive, but of the coordinated selection of suspension and steering parameters. Thus, the vehicle requires fewer correcting movements of the wheel and can turn corners more quickly and safely, especially on slippery roads.

Among the deficiencies of front-wheel drive vehicles in the past were a wide turning radius, conditioned by the specificity of the constant velocity universal joints, and insufficient means for overcoming steep grades because of the unloading of the drive wheels. The VAZ-2108, as is apparent from its technical data, has a smaller (5 meters as opposed to 5.6 meters) turning radius than the VAZ-2105 (a classically designed car), and can handle virtually the same grades.

Technical Data

General data: Number of seats--5; dry weight--830 kilograms; equipped weight--900 kilograms; baggage capacity--50 kilograms; trunk volume--0.31 cubic meters; allowable weight for a towed trailer without brakes--300 kilograms.

Operating indicators: Top speed (with the driver and one passenger)--150 kilometers per hour; acceleration from 0 to 100 kilometers per hour (with the driver and one passenger)--15 seconds; steepest accessible grade on dry ground--34 percent; exterior noise level--78 decibels; interior noise level--73 decibels; life-time--125,000 kilometers. Fuel consumption: with four-speed transmission at 90 kilometers per hour--5.9 liters per 100 kilometers, at 120 kilometers per hour--8.2 liters per 100 kilometers, in typical city traffic--8.4 liters per 100 kilometers; with a five-speed transmission--5.7; 7.8; and 8.4 liters per 100 kilometers respectively.

Dimensions: Length--4006 millimeters; width--1650 millimeters; height--1402 millimeters; base--2460 millimeters; front wheelspan--1390 millimeters, rear--1360 millimeters; smallest turning radius along the axis of the track of the outer front wheel--5 meters; road clearance (with a full load)--160 millimeters.

Engine: Number of cylinders--4; cylinder diameter--76 millimeters; piston stroke--71 millimeters; operating volume--1289 cubic centimeters; compression ratio--9.6; gasoline--AI-93; maximal power--65 horse power per 48 kilowatts at 5600 revolutions per minute; maximal torque--9.6 kilogram force-meters per 94 Newton-meters at 3600 revolutions per minute; valve mechanism--a camshaft in the cylinder head, driven by a toothed belt; carburetor--two-chamber Soleks; ignition system--electronic, pointless; starter--with faced commutator.

Transmission: Clutch--dry, single disk with mechanical cable drive closing; gear box--four- or five-speed, dual shafted with synchronizers on all gears; final drive, united in a common case with the gear box--cylindrical skew gears;

power to the front drive wheels--half-axles of unequal length with spherical constant velocity universal joints.

Wheel suspension: Independent spring hanger, front--MacPherson type, rear--with interconnected longitudinal levers; shock-absorbers--hydraulic, telescoping; roll stabilizer--torsion, united with the suspension arms of the front wheels.

Control: Steering--rack-and-pinion; steering column--with a 90 millimeter bellows that folds on impact with the steering wheel; braking--operating with disk brakes on the front wheels and drum brakes on the rear, parking--drum brakes on the rear wheels; brake drive--hydraulic, dual-profile with a diagonal connection of the brake lines and a vacuum booster.

Wheels and tires: Wheels--stamped with four-bolt attachment; tires--radial 165R13 or 165/70SR13.

Body: Three-door, five-seat hatchback; equipment--safety belts, regulated by the angle of the seat back and the position of the headrest, washers and wipers for the windshield and rear window, halogen headlamps, hydraulic headlamp adjustment.

[No 12, Dec 84 p 6]

[Text] In the last issue we granted space to G.M. Mirzoyev, chief designer of the Volga Motor Vehicle Works, for a story about the plant's new front-wheel drive model, the VAZ-2108. The conclusion of his article follows.

Economy. The basic factors that reduce fuel consumption are, as we know, lowered tractive resistance and improved economical characteristics in the engine. The total reduction in the mass of the VAZ-2108 was achieved not only through the use of a more rational lay-out plan, but also by the broad utilization of aluminum for radiators and other parts as well as of plastics (about 80 kilograms as opposed to 50 kilograms in the VAZ-2105) instead of metal.

The lay-out of the VAZ-2108 allowed us to give its body a more advantageous shape and to reduce the drag coefficient from 0.47 to 0.38. As a result, losses connected with air drag were cut, as was fuel consumption. Limited improvement in economy was also achieved by using radial tires--the MI-166B model as well as the low-profile series 70, which create less friction.

An entirely new engine was designed for the VAZ-2108. In terms of power, it is virtually identical to the power-generating set of the VAZ-2105, but it is 20 kilograms lighter. A new combustion process, a coordinated selection of gas distribution phases, and the configuration of the combustion chambers and flues--all of this allowed the compression ratio to be raised from 8.5 to 9.6 at the same fuel octane rating. As a result, the engine's economy has improved noticeably. This was also facilitated by a new carburetor, ignition system, and a whole series of improvements.

Most VAZ-2108 vehicles will be assembled with a five-speed overdrive transmission, which allows the engine to operate on a more economical regime under limited conditions (ZA RULEM, 1979, No 11).

On the whole, the five-speed model of the new car consumes 18-26 percent less fuel than the VAZ-2105, and the four-speed model uses 18-20 percent less.

The econometer will provide valuable help for the VAZ-2108 driver in choosing the most economical travel mode. This instrument (ZA RULEM, 1982, No 4) is being installed as standard equipment for the first time on Soviet motor vehicles.

Safety. The VAZ-2108 is a modern high-speed vehicle, and in the coming years it will be represented in transport production in fairly large numbers. Consequently, its design should contain such elements of active and passive safety as do not become obsolete. The distinctive road handling features of the front-wheel drive model by themselves form the basis for the safe operation of the vehicle. Along with them, the active safety of the VAZ-2108 is guaranteed by an entire complex of other technical solutions. They include dual-profile "diagonal" braking control, a two-section regulator for brake power, and also front suspension with negative arm for running in the wheels (ZA RULEM, 1979, No 11).

The windshield and rear window washers and wipers, external rear-view mirrors, non-glare glass instrument shield, and the highly efficient power brakes make their own contribution to the prevention of accidents.

The SVD--built-in gauge system--plays an important role in informing the driver of defects in the vehicle's important safety elements. It signals a drop in the level of brake fluid, dangerous wear of the brake-shoe lining, a tightened parking brake, a fall in oil pressure, and battery discharging. In case of malfunction, a "stop" sign and an indicator of the specific defect light up on the instrument panel.

The list of passive safety devices, in other words those that prevent the possible consequences of an accident, has also been expanded. The force plan chosen for the body ensures the preservation of living space in the passenger compartment in collisions from the front, rear, or sides, and at the same time disperses the energy of the impact. Testing of the VAZ-2108 in head-on collisions with an immobile obstacle at speeds of 50 kilometers per hour showed that under these conditions the front glass remains in place and the doors open easily.

Among the other passive safety elements it is not only the headrests, belts, soft upholstery on the instrument panel, and window posts that deserve attention, but also the power intensive bumpers made from fine-mesh polyurethane. They do not suffer residual deformation after collisions at low speeds. As far as the 45-liter fuel tank, it is removed to a place under the rear seat where it is protected from damage.

Longevity. The service life of the modern passenger car, as we know, is determined largely by the life of the body. A number of measures have been stipulated for a substantial (up to eight years) increase in the corrosion resistance of the VAZ-2108. Among them are the use of "tsinkrometall"--steel with a galvanized coating--for separate parts as well as a protective mastic and a new method of applying primer.

Since spot welded seams in the joints of the body become corrosion centers, first of all they will be treated with a special sealing mastic that prevents the

formation of rust. Among the stipulated anticorrosion protection measures are a more stable, thanks to electrophoresis, priming of the panels before painting, special treatment of covered spaces, and the application of a protective epoxy composition film in the finishing treatment of the body.

Service. The modern tendency to reduce the labor input for service work and to use those assemblies that have a lifetime supply of lubrication or that require less frequent adjustment and checking (ZA RULEM, 1977, No 9) has been thoroughly reflected in the design of the VAZ-2108.

Thus, for the first time in domestic auto engineering history, a vehicle is being assembled with a service-free battery, a pointless electronic ignition system that needs no adjustment, self-adjusting brakes, constant-velocity universal joints in the front-wheel drive, and double-row ball bearings in the wheel hub with a lifetime supply of lubricant. Those named, as well as other technical solutions, allowed the period between servicings to be greatly lengthened. In this connection, note that VAZ-2108 service, including oil and air filter changes, should be conducted every 15,000 kilometers, and spark-plugs every 30,000 kilometers as needed.

For operating checks and maintenance of a vehicle in good repair, the built-in diagnostic system will be a great help. Its gauges are connected to the important elements of electrical equipment--the generator, battery, voltage regulator, ignition distributor, and instruments of lighting equipment. Through a terminal situated in the motor compartment, these gauges can easily be hooked up to diagnostic equipment at a service station.

External appearance. The new vehicle differs in every way from its predecessor, and has a memorable appearance, thanks to the wedge shape of the double-volume body with its flexible side windows and minimal chrome decorative elements. Steeply angled front and rear windows, clearly expressed formed wheelcut edges, and block headlamps, the external surface of which blends into the shaped surface of the body, are characteristic of the VAZ-2108.

In addition to the three-door modification, a five-door one is planned for future production. Besides this, there are plans to produce the vehicle in variously finished and equipped models.

As comprehensive testing and operation in various climatic and road conditions has shown, the VAZ-2108, in terms of its consumer qualities, does not only differ sharply from other vehicles that are common here. It is not inferior to the best foreign analogs of its class. The car is well suited to operation in our country and, we may boldly say, in these conditions it surpasses foreign models.

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MOTOR VEHICLES AND HIGHWAYS

UDC 630*848.7:621.86

LT-175 SELF-LOADING TRANSPORT DESIGNED FOR TIMBER INDUSTRY

Moscow STROITEL'NYYE I DOROZHNYYE MASHINY in Russian No 11, Nov 84 p 24

[Article by Engineers V. D. Tarakanov (KirNIILP) and B. G. Dobrikov (VPKilesmash): "The LT-175 Self-Loading Transport Truck"]

[Text] The LT-143 tractor truck, which is well known in the resinous-wood procurement industry, and is based on the wheeled superpowerful T-157, is operating successfully in the capacity of transport equipment, and is making up for shortages in road transport for delivery of raw resinous wood materials. However, the use of this vehicle as part of the production-line in resinous wood procurement requires it to have loading mechanisms. The grab-equipped LT-72 stacker is used to a limited degree. Other equipment which has manipulators has no corresponding grabbing elements for loading the resinous waste wood from various timber-clearing sites, and moreover, the caterpillar drive of these vehicles makes it difficult to transport them to the worksite.

VPKilesmash [possibly All-Union Timber Industry Machinery Planning and Design Institute], in conjunction with KirNIILP [Kirghiz Scientific and Research Institute of the Timber Industry] and the Maykopskiy Machine Building Plant have developed a prototype model of the LT-175 self-loading transport, which is designed to do loading and transport work in the upper timber yards of the resinous wood procurement enterprises. This unit (see Figure) consists of the basic T-157 tractor, the hydraulic manipulator and a semi-trailer.

The prototype self-loading transport has passed the preliminary and acceptance tests under plant and production conditions of the resinous wood procurement industry. The unit ran for 400 hours loading and transporting resin woods, casks of turpentine gum, logging wastes, firewood, ore-posts [rudstoyki] etc. Productivity for loading and outhaulage of resin woods, equalling the amount rated per shift, was obtained.

Tests have indicated that the new vehicle has fully entered the production line and that it is easy to operate. The machine's design insures loading and outhaulage of resin woods and green resin wood timber from the upper and lower timber yards of the resin-woods-procuring enterprises. The operational characteristics of this unit meet the requirements for loading and transporting freight.

The economic result effected by the introduction of a single LT-175 machine into the national economy will amount to around 19,500 rubles per year.



LT-175 SELF-LOADING TRANSPORT

LT-175 SPECIFICATIONS:

Load-lifting capacity of manipulator (with grab-arm extended 6 meters), in kilograms. 900

Turning radius of manipulator in horizontal plane, degrees. 380

Bed capacity, m³.25

Speed of unit, km. 5.4-31.6

Operational productivity (at outhaulage distance of 20 km), m³ per shift.23

Dimensions, mm:

length. 14,600

width. 2,600

height. 3,750

Structural mass, kg. 18,660

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12659
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MOTOR VEHICLES AND HIGHWAYS

DISPOSITION OF COMPRESSED GAS FILLING STATIONS ARGUED

Moscow IZVESTIYA in Russian 16 Nov -84 p 2

[Article by S. Kashirov, deputy minister of the USSR Ministry of the Gas Industry: "Gas Instead of Gasoline"]

[Text] The USSR Ministry of the Gas Industry has examined the article "Gas Instead of Gasoline", which was published in IZVESTIYA (No 272/273, 1984), and reports that he is taking measures to eliminate the lag which has been tolerated in construction of AGNKS's [Motor Vehicle Compressed Gas Filling Stations], planned for this year.

The ministry shares the concern expressed in the article, that the 13 stationary and one small compressed-gas filling stations are working at far from full capacity. At 500 charges per day, each of them can service 1000 motor vehicles, and save 9,500-10,000 tons of gasoline per year. However, due to the small numbers of bottle-gas driven vehicles, the stations are gas-charged up to no more than 15 percent of capacity. And the capacity of only one of the AGNKS's in Moscow is kept at somewhat more than half.

In connection with the forthcoming conversion of hundreds of thousands of vehicles to gas, the number of compressed-gas cylinders subject to checking will reach 6,000,000, and their hydraulic testing, in the opinion of Mingazprom, should be done at centralized points, which are within the jurisdiction of republican motor transport ministries, and in some cases ispolkoms of municipal soviets of people's deputies. Gasoline-powered vehicles can be converted to gas right at these points. The decision of Mossovet [Moscow Municipal Soviet of People's Deputies] to build a centralized gas cylinder examination and vehicle re-equipping station in Moscow exemplifies this approach.

In the opinion of the Ministry, the mobile gas-filling stations which were mentioned in an article in IZVESTIYA ought to play a definite role. With their mobility, they could be used in rural areas, and in regions where it not be profitable to build stationary AGNKS's. On the basis of productivity, ten mobile stations are the equivalent of one stationary station, and are 1.5-fold cheaper than the latter. The availability of mobile gas-filling stations will increase the coefficient of use of the AGNKS's. Mingazprom has built a prototype gas-filling station, which is being readied for test at present. The ministry has asked the USSR Council of Ministers with a request to commission one of the machine-building industries to organize the production of these gas-filling stations.

[Comments from IZVESTIYA] The reply from Mingazprom confirmed the conclusion in the correspondence under the title "Gas Instead of Gasoline", that there was no justification to the disagreement of the departments participating in the solution to this important problem, which has caused appreciable economic losses. The funds invested in the construction of 14 gas-filling stations will, in fact, not yield the necessary output. And it is not known when this situation can be rectified. As yet, USSR Minavtoprom has not replied to IZVESTIYA about what sort of measures are to be taken to increase production of new bottle-gas driven trucks and complete sets of equipment for refitting gasoline-powered vehicles over to gas fuel. USSR Minchermet [Ministry of Ferrous Metallurgy], which was charged with setting up production of gas cylinders and getting them to the motor vehicle builders, is also maintaining silence.

Mingazprom insists that centralized points, or stations, have to be built for testing tanks with pressurized gas as well as for all the rest of the gas equipment. Here the question arises: who is going to finance the republican motor transport ministries for these facilities? If construction on them does not begin immediately, then tomorrow bottle-gas powered vehicles will be out of order, or even more costly, will be reconverted to gasoline power.

It has been noted that Mingazprom is only beginning to test a prototype of the mobile compressed gas station, even though this was discussed at a meeting of the ministry's scientific and technical council, which was held in Lvov in May 1983. Over a year and a half has passed, and the promise about the tests has still not been kept.

After acknowledging the criticism, concrete actions must be taken. That is why IZVESTIYA intends to maintain further control over the solution to the problem of the quickest means of converting motor vehicle transport to this economic automotive fuel.

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MOTOR VEHICLES AND HIGHWAYS

EQUIPMENT FOR NATURAL GAS FILLING STATIONS IN DEVELOPMENT

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 3 Nov 84 p 1

[Article in the form of a commentary by G. Chepurnyy, director of the Tulamashgazzavod [possibly Tula Gas Machinery Plant] by SOTSIALISTICHESKAYA INDUSTRIYA correspondent E. Mokhorov: "At High-Speed Rates"]

[Text] Near Tula, tests have been successfully concluded, under working conditions, of a gas-filling compressor station designed to fuel truck tanks with natural gas. This is the first Soviet gas pump built completely on equipment domestically produced. It was developed by a collective of the Tulamashgazzavod Association, in collaboration with the VNIPItransgaz [All-Union Scientific and Research and Planning Institute for Gas Transport] Institute in Kiev, the Orgremgaz [possibly Gas Equipment Repair Organization] Association, a specialized organization from Krasnodar, and a number of enterprises. Our correspondent E. Mokhorov requested a commentary on this event from the director of the Tulamashgazzavod Association, G. Chepurnyy.

"The first vehicles using natural gas instead of gasoline for fuel appeared in our country's cities fairly recently. And today we're already talking about mass conversion of truck transport to this new form of automotive fuel. Over 1000 gas-filling compressor stations are going to have to be built in this country, and soon.

The advantages in doing this are obvious. Judge for yourself. One fill-up with gas at one of our stations gives a vehicle a range of 200-250 kilometers. Total outlays for fuel amount to 30 kopecks during an entire working shift. The same fill-up with gasoline is many times more costly to the national economy. Of course, the air in our cities will become cleaner. And finally, changing over to this new inexpensive form of motor vehicle fuel will save petroleum, which will then be used predominantly for technological purposes.

Many sectors of the national economy are occupied in earnest with the problem of motor vehicle gasification. A model-run of ZIL's and GAZ's with this new modification has been developed to operate on methane. Should the need arise, these trucks can be filled with gasoline. Besides these, a consider-

able percentage of regular trucks are going to be changed over to this new automotive fuel. A series design of special equipment has been developed for this purpose. For example, just recently we received 200 complete sets of this equipment from the MosavtoZIL [a consortium headed by the ZIL Works] Association. And already this year in Tula, a large portion of the trucks which serve the municipal economy will be operating on compressed methane. The gas-filling station which has been developed in our plant will fill 120 vehicles per day, and more in the future.

But there is another problem which is of primary concern to us today: how soon will there be gas-filling compressor stations in all our country's cities? Development of the first domestically produced gas pump for vehicles has greatly accelerated the resolution of this major national problem. Up to now we have purchased every bit of the equipment needed for gas-filling stations from firms abroad. One of these stations costs about 2,000,000 dollars. The standard model automotive gas pump which was developed in the Tula enterprise came to R950,000. According to preliminary estimates, a series-produced station will cost about R600,000.

Tests have demonstrated reliable operation and high productivity for the entire aggregate of equipment. The heart of the station is the compressor, which provides four stages of compression for the gas. According to its technical level, this remarkable machine, developed by Muscovites, surpasses foreign models. All this equipment has been designed for unitized construction, and this is not by accident. These compact units can be delivered along winter roads in the hard-to-get-to regions of the far North. The high level of plant readiness will reduce capital construction outlays for the gas-filling compressor stations 4-fold. If it takes a year to construct stationary gas pumps, then it only takes two months to deliver, install and prepare the domestically produced mobile stations, and this includes site preparation. And the fuel can be obtained directly from the field, or from an operating pipeline.

The first domestic gas pumping station was developed in a very short time: from the planning stage to the start-up and adjustment operations, a total of one year elapsed. This is our labor gift to the anniversary of the Great October Revolution.

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RAIL SYSTEMS

RAILWAYS COLLEGIUM CONCERNED ABOUT LABOR, MANAGEMENT ISSUES

Moscow GUDOK in Russian 27 Nov 84 p 2

[Unattributed article: "In the Railways Ministry Collegium: Improving Work with Personnel"]

[Text] Personnel selection, classification and training are continuing subjects of special concern to the Communist Party. In developing the scientific principles for working with personnel, the founder and leader of our party and government, V. I. Lenin, considered the most important of these to be the selection of leaders according to their political and practical qualities, the proper balance of experienced and inexperienced personnel, the continuity of leadership and ideological/political tempering in the course of the struggle to build a new society. Questions of work with personnel run all through the decisions of the 26th CPSU Congress and successive plenums of its Central Committee.

A new, intense manifestation of party concern with personnel matters was the discussion in the CPSU Central Committee Politburo of Comrade K. U. Chernenko's suggestions on several questions involving current personnel policy.

This country has seen the development of management personnel who are well trained, politically mature and devoted to duty.

As in other branches of the national economy, railroad transport under the leadership of the Communist Party is successfully carrying out the tasks of selecting and training management personnel and has established a pool of qualified specialists capable of performing the tasks set for them. This has permitted a more successful solution of the complex and highly critical problems facing transportation interests.

We are approaching the end of 1984 and the final phase of the 11th Five-Year Plan. Serious efforts are required from every work site, every specialist and every operational leader in order to satisfy planned assignments and socialist obligations.

In this connection, the meeting of the Railways Ministry Collegium addressed serious shortcomings in work with personnel. These areas include leaders who

manage poorly and who do not keep pace with demands. On the other hand, there are frequent occurrences of management promotions made in haste and through a "questionnaire" approach. This leads to errors and unjustified personnel interchangeability.

There are still frequent direct violations of Leninist personnel work principles. This sort of action sets up an undemanding situation which spawns different types of negative effects and abuses.

In the last two years the Railways Ministry Collegium has increased standards for the performance evaluation of all grades of managers. Line and department directors not providing adequate management of the resources entrusted to them have been relieved of their duties.

V. I. Lenin demanded that highly competent people rise to leadership positions. He emphasized that "no factor of merit and no party authority will replace that which is most important in the given case, namely: knowledge of the matters at hand..." Under the present conditions of a scientific and technical revolution, this criterion is of even greater significance.

Occasionally, however, this is not taken into consideration as it should be. In a promotion careful consideration is not always given to such matters as the person's suitability for a specific responsibility, his competence in the field for which he is considered or the collective's opinions of him. This leads to errors which have to be corrected at high expense later. Due to poor practical training and a lack of self-confidence, some workers exhibit excessive caution and unnecessary timidity in their work and are afraid to take a justifiable risk.

This was the case with the former chiefs of the Alma-Ata Division, Comrade Akhmetov, the Murmansk Division, Comrade Unukovskiy, and the Baku Division, Comrade Azadov. It must be assumed that railroad management was aware of the capabilities and capacities of these men, however, they were kept in responsible positions for an extended period.

Notice has been taken at Collegium meetings that there remain disgraceful cases of account padding, misappropriation and acceptance of bribes. During 1983 and the first 10 months of this year, the list of persons fired for abuse of position and immoral conduct includes the former deputy chief of the Moldavian Railroad, Kondakov, the chief of services for the October Railroad, Dmitriyev, the chief of the Tayshet Division, Kuzin, and the Volga Railroad chiefs of services, Golovko and Savin, as well as several others.

An abnormal situation was eliminated in the Railways Ministry Worker Supply Main Administration. Here, in two years seven railroad worker supply administration chiefs and chief accountants were fired for abuse of position. The Ministry also had to investigate several complaints and indications of account padding and various machinations with resort homes and automobiles, as well as other situations allowed by individual managers.

These are the result of poor training and lack of control. An uncompromising struggle must be waged against such occurrences. A few corrupt people cannot be allowed to disgrace an army of millions of Soviet railroad workers. A climate of intolerance and general contempt must be formed around the wrongdoers.

One great threat to our work is the practice, long discussed by the party, of transferring failing or compromised workers from one post to another.

This must be decisively ended by establishing a rule that failing workers cannot re-enter management positions until they have demonstrated improvement while working in a lower-level position.

Many shortcomings and errors result from a lack of reliable controls on personnel performance. Each manager should constantly be monitored from above and below, and should be aware of his responsibility to superior entities and to his comrades.

An increase in worker responsibility promotes further development of the democratic principles of personnel work. In a promotion, it is essential that the views of the candidate held by the party organization, the labor collective and the public be brought out. Those of us in the transport field must expand the implementation of a competitive system for filling posts.

Special mention must be made of the matter of certifying management and engineering/technical personnel. Nearly 400,000 managers and specialists were certified between 1981 and 1984. Is this not the best means by which to give the specialist a complete evaluation of his practical and moral/political qualities? Unfortunately this matter is impaired by formalism and is carried out in an irresponsible, "rubber stamp" fashion. The primary managers charged with direct responsibility for this work are not performing it. Certification committees act on a case-by-case basis. Certification procedure periods are violated and information on candidate qualities is not prepared. Indeed, if such information is prepared, it is only a formality.

The Collegium meeting noted that certain stereotypical characteristics were taking shape. In many cases these characteristics reflect nothing beyond information from application forms. They could be made applicable to any worker by merely changing the name.

The field of transportation has unlimited possibilities for continually recruiting the best representatives of the working class, intellectuals, women and youth. This is especially notable when considering the promotion of youth to management positions. In fact, there is a major, fundamental question -- that of assuring the continuity of leadership. This question must be approached with party and government-wide positions. Our task is to exercise continual care so that promising young comrades are working with persons of the older generation in all areas of railroad transport.

Every manager needs to conscientiously develop persons capable of succeeding him if necessary.

We have an established system of promoting personnel. Some railroads operate the system efficiently. There are a number, however, which operate the system as a formality: a list is drawn up and accounts are made to show a reserve of manpower for promotion. When a need for promotion actually arises, it seems there is no one to be found.

There must be a more responsible approach toward training a reserve and preparing specialists in terms of a given level and profile of management work. Most importantly, maximum use must be made of all opportunities to examine and, at the same time, instruct workers in the art of leadership and to develop in them the required political qualities and organizational skills.

The promotion of women into management positions is an important question in personnel policy. The field of transportation has many examples of outstanding and irreproachable work by women in responsible positions. There is no doubt that only success can result if we become bolder and more decisive in moving women into all levels of management.

It is known that personnel stability is one of the unchanging prerequisites for successful and productive work. But this does not need to cause stagnation on the job. Individual managers working at the same place for a prolonged period occasionally lose the sharp outlook and instincts held by new managers.

The party teaches us to regulate the process of replenishing personnel resources, proceeding from specific conditions and taking into account the individual characteristics of each worker. Frequent lateral moves of management workers to equivalent areas are called for. A more intensive and systematic exchange of workers between central and outlying areas should serve the same ends.

Improvement must be made in the system of worker refresher training and qualification advancement. This system must be flexible and responsive to changes brought about by the intensification of transport work.

The massive army of engineering/technical workers and specialists is the most important source of personnel for management positions. At this time we have 750,000 specialists working, i.e. one out of five railroad workers is a specialist with higher or secondary education. Our success depends directly on how we organize the development and promotion of these people, and on how we increase their qualifications, initiative and responsibility.

Much has been said about shortages of specialized employment opportunities for young specialists. This matter is far from having improved however.

The transportation field is still notorious for its personnel turnover. The fact that young people voluntarily quit their posts is especially bad. The Railways Ministry Collegium and the trade union central committee presidium recently called attention to this problem. The railroads must prepare effective measures to keep young workers.

The Collegium emphasized that it is time to strengthen the demand for personnel training, beginning with railroad and Railways Ministry administration managers, and to decisively replace those who cannot bring matters to order rapidly. Many examples of how such a change fundamentally modified a situation were brought up at the meeting. For example, the new chief of the October Railroad, Comrade Fadeyev, has in eight months brought about a drastic improvement in his operation. Month after month the railroad is successfully fulfilling planned tasks and its cargo handling pace is accelerating. A strengthening of Volga Railroad management also brought positive results. This line has also improved train traffic, especially in the area of shipping high-demand goods.

The Irkutsk Division of the East Siberian Railroad has long operated under great difficulties. With the appointment of Comrade Komarov, a young, innovative manager, as its chief, the division sharply improved its railroad operations. The Lvov Railroad's Mukachevo locomotive depot collective had not emerged a winner in socialist competition in five years. Things changed quickly when Comrade Romanishin, formerly deputy chief of the Zdobunov locomotive depot, became depot chief. Based on third quarter results, the collective won the Railways Ministry's and trade union central committee's Challenge Red Banner award.

The Collegium unequivocally set forth the question of increasing the role and responsibility of railroad deputy chiefs in personnel relations and in social matters. They should be organizers rather than executives. Who, if not these managers, is to bear the primary responsibility for fulfilling residential construction plans, or for improving working, nutritional and living conditions? The workers' attitude depends on these conditions. In turn, this attitude results in successful work when combined with good discipline and high social and labor activity.

The Collegium expressed certainty that transport personnel work will doubtless improve if managers at all levels address it in accordance with party and state guidelines and if each worker acts in full consciousness of the enormous responsibility he bears and directs his efforts to attaining the final result--satisfaction on the part of the national economy and the population with cargo handling.

Personnel policy must become one of the effective tools for implementing the critical tasks assigned to railroad transportation by the party and the government.

12746
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RAIL SYSTEMS

GRAIN LOSSES DUE TO CARELESS CAR UNLOADING

Moscow GUDOK in Russian 14 Feb 85 p 1

[Article by D. Patoka, chairman of people's control group, Odessa Port Station, in the column "Serious Warning": "Grain on the Tracks"]

[Text] Every day, many empty grain cars arrive at the Odessa Port Station. State grain inspectors and railroad personnel inspect the cars before they are sent to the docks to be loaded. When the bottom hoppers are opened during inspection, grain spills out onto the railroad ties. There is often an entire string of such rail cars, each containing from 300 to 800 kg of leftover grain.

Such occurrences have become systematic in recent times. Nearly every day, we send telegrams to various people, asking them to bring to task those responsible for this problem, but so far there's been no movement in that direction. We try very hard to save each and every grain, but it's difficult work. Part of the grain remains mixed with rubble on the tracks. There's just about everything there: wheat, corn, barley, sorghum and sunflower. These "empties" come from the Shumikha Station of the South Urals Railroad, the Kupyansk Station of the Southern Railroad and the Seyma Station of the Gorkiy Railroad. It would probably be useful to show the station managers the results of their slipshod work.

One might ask: haven't the Odessa railroad workers been able to make an example by punishing those responsible for this? Once, the people's controllers of our station found a rail car with over 10 tons of wheat left in it after unloading. The controllers' demands apparently had an effect: workers in the transport shop of the Odessa Grain-Products Combine were reprimanded.

In order to avoid losses, we created special posts in each shift, where our observers V. Kaminskaya, A. Ismatova, L. Zakrinichnyy and others try to save each and every grain. But clearly our efforts alone are not enough. The observers of all stations and grain-collection enterprises must mobilize against those who are careless with grain.

12595
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RAIL SYSTEMS

PROBLEMS IN RAIL SHIPMENTS OF GRAIN FROM ODESSA

Moscow GUDOK in Russian 25 Jan 85 p 1

[Article by GUDOK correspondent M. Gorbis, Odessa, in the column "Accelerating Feed Deliveries": "Looking for the Switchman"]

[Text] Noon. January 14. The telephone persistently rings in the office of P. Petrov, switching dispatcher of the Odessa Port Station. A. Proskurnya, the Odessa Division duty officer, reported that a consist with empty covered feed cars was approaching the station.

"We're not going to be able to leave on time again," said the very upset Petrov. "I've got the 11:30 train taking corn to the Dneprovskaya Station ready to go, but there's no way I can get it out because of the train situation. We have twice our norm of rail cars in the station yard. Four abandoned consists containing freight for the port have been sitting here for two weeks now. All our switches are manually operated. And, in my last nighttime shift, we were short five switchmen. Just try getting a lot of work done under conditions like that."

And as if to confirm his words, the agitated voice of the port elevator representative came in over the loudspeaker:

"Grain loading is at a standstill. We need good grain shields. The ones they sent are no good."

"I have a gondola-load of new grain shields, but the port workers refused to unload them because of the glare ice."

During January, the representatives of railroad administrations, divisions, the procurator's office and people's control were regular visitors at the Odessa Port Station. The station is not meeting its plan for feed shipments. For the first 15 days of January, it was short by 1,520 feed-grain rail cars. The feed is sorely needed by the country's livestock farms. Maybe the station just doesn't have anything to ship? Not so. Five vessels are being unloaded at port, and six others are in the roads awaiting their turn.

What happened? Reconstruction of the Odessa Port Station took place last year. By 1 January, SMP-816 of Odesstransstroy Trust was to have completed the centralized electrical system. And they completed it...on paper only. Therefore, one of the three exit tracks is shut down daily for construction.

Sixty-eight switches have to be thrown manually. In addition, it turned out that 24 people were not enough to service the switches around the clock and the train make-up brigades were short of people. It was only on 13 January that three train make-up workers arrived from neighboring stations.

The feed shipments could be accelerated by block routing. But often, the station personnel's efforts are for naught. It takes a long time for a diesel locomotive to arrive. Sometimes, only one block train is dispatched per shift.

Of course, the fact that the station has lost some of its maneuverability has a great influence on the unsatisfactory work organization. Another problem is that hundreds of rail cars carrying urgent freight have accumulated at the port, and it is taking a long time to unload them.

Of course, the January cold weather and ice have made conditions very difficult for the railroads and the port. Therefore, all measures must be taken to ensure that they cooperate closely around the clock. The cooperation is anything but close in practice. Another factor in the slow feed unloadings at the Odessa Port Station is the constant fluctuation in the number of empty cars arriving, especially empty grain cars. The Odessa Railroad received 1,640 fewer grain cars than planned during the first two weeks in January. It should be noted that these cars have a vast distribution area: from the Southwestern and the Southern Railroads to the Alma-Ata and Central Asian Railroads. However, effective measures are not being taken to speed the unloading of grain cars and their return to the Odessa Railroad port stations. This has caused long delays in feed shipments from Ilichevsk, Nikolayev, Izmail and other stations. Overall, the Odessa Railroad had almost a 4,000-car shortfall in car loadings for January.

The situation with covered rolling stock is no better. Considering the urgency of the matter, it was decided to provide daily the railroad's washing stations with the necessary number of covered cars and transfer at least 300 such cars to the Odessa Division each day for grain loading. But, since the beginning of January, the port stations have received only 70 percent of the necessary quantity of rolling stock. The rail traffic-service workers are responsible for this--they are slow to return the empties to the washing station. But the most serious charge of negligence must be leveled against the rail car workers. State grain inspectors rejected almost every tenth rail car coming from the Razdelnaya, Pomoshnaya, Znamenka and other preparation stations to the Odessa Port Station alone since the beginning of the year.

Many grain cars arrive from the Southeastern, Volga, Kuybyshev, Southern, Alma-Ata and other railroads with large amounts (up to several tons) of the previous loads still in them. When the empties are inspected, the bottom hoppers are opened and grain spills right out onto the tracks. Special subbotniks are organized to collect and store this grain.

12595
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RAIL SYSTEMS

MEASURES PLANNED TO DECREASE NUMBER OF RAIL ACCIDENTS

Moscow GUDOK in Russian 16 Jan 85 p 2

[Interview with Yevgeniy Grigor'yevich Dubchenko, first deputy chief of the Locomotives Main Administration, by GUDOK correspondent L. Bulankov; date and place not specified]

[Text] Train traffic safety mainly depends on the discipline, preciseness, and alertness of locomotive crews. It is well-known that a signal is a command that no one is allowed to violate. Running an inhibit signal leads to an accident or derailment. This is now a crime. This past year, in comparison with the one preceding it, the number of cases of going through inhibit signals, although it has decreased, was very sizeable. What measures are being taken to radically change this situation? Our correspondent L. Bulankov addressed this question to the first deputy chief of the Locomotives Main Administration Ye. Dubchenko.

[Answer] Yes, the traffic safety situation is very alarming. Our main administration intends to pay the greatest attention this year to this important matter. We will attach great importance to improving the occupational training of locomotive crews and strengthening their performance and labor discipline.

Along with the traditional ones, we are undertaking a number of new measures directed at preventing the running of inhibit signals. Our analysis shows that more than 20 percent of such cases occur when the crew goes to sleep while the train is moving and 20-25 percent when the crew dozes.

[Question] Yevgeniy Grigor'yevich, how do you explain the fact that a crew is sometimes overcome by sleepiness on the job?

[Answer] The main reason is extreme fatigue caused by not observing a work and relaxation routine. Of course, it happens that a wide-awake crew is inattentive and is distracted from obeying signals. This means it is necessary to increase educational work in the depot, strengthen discipline, and improve labor organization. The main administration has planned a number of measures aimed at more energetically introducing personal schedules and a non-call attendance system on a trip.

Putting together personal schedules is a difficult and labor-intensive job. It was decided to use a computer for this. The first tests were conducted in the Otrozhka depot. They were convincing in practice--the innovation is worthwhile and fully workable. We plan to use this innovation at first in the locomotive depots of the Southwestern, Southern, and Southeastern Railroads.

Our specialists, together with doctors, are thinking a great deal about how to prepare a crew better for a trip. The question is not only about monitoring whether a crew has used home rest correctly so that efficiency on the trip would be high. Psychological relaxation and a mood of steady alertness are necessary for a crew before a journey.

In accordance with the recommendations of the main administration, psychological relaxation rooms and dispensaries have been fitted out in the Kurgan, Vilnius, and Lvov-West depots. The results are positive. We will spread the experience which has been gained.

This year we hope to introduce good hot food, in place of dry rations, for crews during a trip. This factor is of no small importance for morale. A draft order on this question has been prepared. Additionally, to maintain the necessary amount of crew cheerfulness and efficiency during a trip, a special set of physical exercises has been developed for them. The installation of sports training equipment is beginning at turn-around points and rest houses.

We are preparing still another order--on the professional selection of candidates for an engineer's job. It is very important that only a person who has suitable physical and physiological qualities for working on a modern locomotive could become an engineer. When investigating the running of an inhibit signal, it is quite often discovered that it was close to impossible to admit it to an inspector because of the engineer's type of nervous system.

[Question] You are always talking about engineers but isn't there equipment to prevent running inhibit signals?

[Answer] Yes, our diesel and electric locomotives have been equipped with ALSN/automatic continuous-action locomotive signalling/. However, the standard ALSN system, in situations where the engineer has fallen asleep or become drowsy for a time, often gives up. A person, after hearing the warning signal in his sleep, quite often intuitively and automatically pushes the alert lever and the automatic stop is switched off.

Several new devices to prevent running signals have now been developed. A SAUT/automatic brake control system/ has been tested at the Lobnya depot. The results have been very encouraging. It is necessary to get industrial production going.

An ALSN with engineer alertness monitoring by a warning light without an EPK whistle has been tested at the Volkhovstroy and Dno depots. They have started using assistant engineer alertness control devices on the Lvov Railroad. They are testing a "Dozor" alertness monitoring device at the Tuapse depot. New equipment will come on the railroads this year already but, unfortunately, in a quantity very far from the current requirement.

Once again I will stress that equipment is equipment but the main ingredient is the person--his discipline, preciseness, skill, and attitude toward work. Most important of all here is the sound selection of a cadre of engineers and assistants, an increase in their responsibility, and a strengthening of discipline.

In this matter we will lean on the help of party, trade union, and Komsomol organizations, and the general public. We are trying to promote in every possible way the work of traffic safety public inspectors and engineer instructors.

In the first quarter the main administration will run regional schools for exchanging experience on providing traffic safety in the locomotive field. We will discuss these questions in more detail there.

[Question] Educational work is important but it is not only inexperienced and careless people who are running inhibit signals. Unfortunately, this happens at times to someone who has worked beyond reproach for many years and was always on the alert. Suddenly this person has fallen asleep or has begun to nod. How can this be explained?

[Answer] It is not possible to offer any objective excuses for sleeping or nodding in front of a locomotive control panel. He undertook driving a train, so he should please be bright, alert, and attentive. The life of people, the safety of highly valuable materials, and the uninterruptedness of the transportation process depend on this. There can be no slackness here. At the same time our eyes must not be closed to everything that leads to lower engineer efficiency.

Attention to locomotive crew work and relaxation has lessened in recent years under tense working conditions. Each engineer or assistant engineer last year had an average of about 160 overtime hours. Labor legislation permits a maximum of 120. This is an average line figure. It is much higher on some railroads. On the Azerbaijan Railroad, for example, overtime averaged 333 hours, on the Volga--320, the West Kazakhstan--283, and the Alma-Ata--255 hours.

Yes, the overwhelming majority of locomotive crews are dependable people. They understand all of the difficulties, they see that there are not enough people and they do not refuse to work overtime. At times they leave on another trip after the minimum 12-hour home rest. They know that trains cannot and must not come to a standstill. Fatigue, as the doctors confirm, gradually builds up. This fatigue can turn into a tragedy on any trip especially when the continuous work length rule is crudely violated by a large number of overtime hours.

The engineer Khalilov of the Baladzhary depot started his next trip, having 1,072 overtime hours to his credit for the year. The trip lasted longer than set by the norm. The engineer fell asleep and ran the inhibit signal of the Zorat station starting light. And this is not the first such case.

One conclusion can be drawn--it is necessary to regulate the train traffic rate, clearly organize the work and relaxation of locomotive crews, and more decisively struggle against everything that leads to overtime work. It is necessary to increase the responsibility of traffic organizers and locomotive masters for each case of violating the established length of continuous work of electric and diesel locomotive workers, and for train delays along the line.

It seems that the network measure from 1 January to 1 April of this year announced by the Ministry of Railways under the motto "Organizing the Work and Relaxation of Locomotive Crews--Constant Attention" will help to bring order to this very important business and will improve the traffic safety situation in locomotive management.

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RAIL SYSTEMS

MAKAT--ALEKSANDROV GAY RAIL LINE CONSTRUCTION PROGRESSES

Moscow GUDOK in Russian 27 Nov 84 p 4

[Article by S. Kasatyy: "Construction: 'Algamba': The Biography Continues"]

[Text] Makat-Aleksandrov Gay--Sections of Construction Administration No. 99 of the Ministry of Transport Construction are building the new 500-kilometer Makat--Aleksandrov Gay rail line. The administration chief, B. Martynenko, says:

"Three construction trains are working. Fifty kilometers of earthen roadbed are already in place for the sleeper grid. Twenty kilometers are ready and the remaining 30 kilometers will be compacted by the end of the year. Next year 160 kilometers of earthen roadbed will be poured, reaching the center of the Inderborskiy Rayon in Guryev Oblast. The finished line will open the shortest route from Central Asia, the center of the country, to the Volga. It will be nearly 1,500 kilometers shorter than the present route."

Bridge builders will be at work next year beginning the construction of required structures. Four Kazakh SSR ministries have taken on the costs of building the new line, hoping to put it into service more quickly for the republic's economy. The situation is that chalk, salt, borates and gypsum are being extracted from near the new Inderborskiy settlement and at this time it is hard to get these goods to processing and market areas. Transshipments are required.

As early as the dawn of Soviet rule, V. I. Lenin conferred great significance on the new mainline. A civil war was raging in this country and a fuel crisis arose. Baku and Groznyy were in the hands of the White Guards. The Red Army, having eliminated intervention in the Caspian region and at the mouth of the Ural River, controlled the operational Emba oil fields with their reserve of 15 million poods of "black gold" already pumped from the earth. Unfortunately, this reserve was difficult to ship out. On 24 December 1919 the government decided to build a rail line from Aleksandrov Gay to Emba and to convert the Krasnyy Kut--Aleksandrov Gay section to wide gage. The job was urgent. V. I. Lenin watched its completion intently. In April 1920 the second revolutionary labor army was organized by a resolution of the Labor and Defense Soviet in order to speed the construction of the "Algamba" project. Construction proceeded at a pace which was rapid for that time. By the middle of June, 250

versts of the Krasnyy Kut--Aleksandrov Gay section were converted to wide gage. The workers' enthusiasm was so great that average daily productivity was 8.5 versts, twice the rate planned. Earthwork and track laying was taking place in five sections simultaneously. Active fighting broke out on civil war fronts at the end of July, however, and army forces had to be sent to the western front. Construction of the Aleksandrov Gay--Emba line was stopped.

The opening of rich fields on the Mangyshlak peninsula, intense economic development of southern Kazakhstan and construction of irrigation facilities in Central Asia dealt blows to the construction of new rail lines in these regions. The rails of a 900-kilometer Uzen--Shevchenko--Makat line were laid across the torrid, sandy steppes. This railroad led to the Mangyshlak oil fields and sped their industrial development. Next, a line was built to link Guryev and Astrakhan, then Beyneu--Kungrad. This section, now a mainline, gives Central Asian cargos access to the center of our country.

The completion of the Aleksandrov Gay--Makat line--called the Algamba in the first years of Soviet rule--will provide a reliable transport link to the southeastern portion of the country.

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RAIL SYSTEMS

CHIEF ON PROBLEMS, FUTURE OF CENTRAL ASIAN RAILROAD

Moscow GUDOK in Russian 8 Dec 84 p 3

[Interview with Nikolay Andreyevich Belogurov, Central Asian Railroad chief, by GUDOK correspondent R. Biktagirov, in Tashkent, date not given: "Strong with Brotherhood"]

[Excerpts] Spring comes to us from well-known Kushka, the southernmost point--and southernmost station--in our country. Then a flood of red poppies spreads to the Aral itself, not skipping the desert. Now, during these winter days, the process reverses as it were. A scarlet wave of red calico moves southward from the Aral, from the gray shores of the Caspian to the snow-covered Pamir mountains. Thus, one after the other, the Uzbek, Tajik and Turkmen Soviet Socialist Republics, as well as the communist parties of these republics celebrate their sixtieth anniversary.

The Central Asian Railroad carries the lifeblood of these three republics. Our correspondent discusses its meaning for brother peoples with the railroad's chief, N. Belogurov.

[Question] And what about the rule about not forgetting shortcomings during celebrations?

[Answer] Undoubtedly, Central Asian Railroad workers, especially their leaders, have something to think about. In recent years a number of technical and economic railroad work indicators have declined in spite of a significant growth in transport volume. The unusual accumulation of cars has become the talk of the railroad. The locomotive fleet is badly used. Things reached the point where diesel locomotives have been sent to us from other lines.

It's probably not necessary to list all the shortcomings. The important thing is that we identify them and seek means to correct them. Specifically, some progress has already been noted in the items referenced earlier. In-depth analysis showed that we simply don't know how to manage the equipment we've been given: diesel locomotives "idle" along almost the entire line--from Pamir

to the Caspian. An engineering-justified change in departmental boundaries for locomotive and crew service sectors allowed us to correct these problems.

Railroad management is now implementing a number of other organizational, technical and industrial innovations. These are directed toward keeping pace with the transport leaders, those who are now achieving the best indicators in increasing train weight, raising car static loading, improving labor productivity, reducing transport costs and improving passenger servicing.

[Question] We have spoken about the past and present railroad. How about a look at the future?

[Answer] I'm happy to discuss it. Especially since the reconstruction and conversion work planned for the railroad is, without exaggeration, enormous. Electrification of the Chengeldy-Tashkent section has already begun and will be completed next year. Next, supports will be erected from here to Bukhara and Kokand where electric locomotive depots will be set up.

The 12th Five-Year Plan will give us complete automatic block signalling and full dispatch centralization. The switching engine fleet will be supplemented and renovated. The three-section "giants" will appear on the crucial lines.

This list could go on and on.

In answer to this responsibility, railroad workers are ready to exercise maximum discipline and creative boldness. They match all their work and thoughts with the demands of the party outlined by Comrade K. U. Chernenko, who in recent speeches has often spoken of the need for speeding the intensification of production. The Central Asian collective is fully resolved to fittingly complete the five-year plan and to participate in the performance of subsequent communist construction tasks with new enthusiasm.

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RAIL SYSTEMS

PREPARATORY WORK ON CAUCASUS MOUNTAIN RAILROAD PROJECT

Moscow TRUD in Russian 3 Feb 85 p 1

[Article by S. Arkhipov: "Projects and Achievements: Beginning of a Mainline"]

[Text] Ordzhonikidze--The first work on the future Caucasus Mountain Railroad [Kavkazskaya Pereval'naya Zheleznaya Doroga] has been initiated by builders from the Ordzhonikidzetransstroy Specialized Trust.

A number of important facilities have to be built on the future mainline's right-of-way. Construction of a new mechanization administration, automobile enterprise and technical and vocational training base will begin this year in the North Ossetian capital. Nearby, in Beslan, plants for asphalt/concrete production and large-panel housing construction will be built. It is not by accident that this work is planned at the very outset of building the new railroad. Once in service these projects will allow construction to begin immediately on housing for builders and service personnel, as well as on child care and school facilities. A. Kuz'min, chief of the Ordzhonikidzetransstroy Trust technical department, explained the future railroad's layout to me.

"The Ordzhonikidze-1, Tarskaya and Targim Stations will be in the mainline's northern sector," said A. Kuz'min. All of them will have the necessary living facilities. The largest public center in this area is planned for the Targim Station. It will include a kindergarten, housing, cultural buildings and a modern dining facility.

Developments on major projects along the route are also awaiting construction personnel. Here in the northern sector the Arkhotskiy Tunnel, several kilometers in length, is to be built at a 1400-meter elevation, deep in the Main Caucasus Range.

Specialists from the Lenmetrogiprotrans and Tbilisi Kavgioprotrans organizations have determined the future mainline's "appearance". It will be a modern electrified railroad, with much of its 180-kilometer length running through tunnels. More than 70 large- and medium-size bridges and viaducts, as well as 350 small, man-made structures will have to be built.

The Caucasus Mountain Railroad will become one of the most elaborate engineering structures. Nevertheless, according to economists' calculations, it will pay for itself in a very short time. Significant savings will result just from the 700 to 1000-kilometer reduction in cargo hauling distances compared to current routing along the Black and Caspian seas. Furthermore, the new line will open up great possibilities for social development in many North Ossetian, Checheno-Ingush and Georgian areas. In time major enterprises involved in mining and technical/mechanical repair and servicing will appear along the Caucasus Mountain Railroad, together with Pioneer and tourist camps. All of this in a region which before was barely accessible to those on foot.

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RAIL SYSTEMS

PLANNING FOR CAUCASUS MOUNTAIN RAILROAD ADVANCES

Moscow GUDOK in Russian 8 Feb 85 p 2

[Article by GUDOK correspondent S. Babayan under the rubric "Pathways to Technical Progress": "Caucasus Mountain Railroad: At the Starting Line"]

[Text] Tbilisi--As reported earlier in GUDOK, preparations for the construction of the Caucasus Mountain Railroad [Kavkazskaya Pereval'naya Zheleznaya Doroga] are underway along a wide front. This railroad can be called unique in terms of the complexity of its facilities and the originality of the technical solutions proposed for their construction.

The bold idea of crossing the Caucasus Mountains required the concentration of great scientific forces. Scientists, designers and surveyors have already covered many kilometers of the future route. From tent camps they have climbed high into the mountains in helicopters, on horseback, on tractors and even in mountain climbing gear. They have bored test holes, dug galleries, studied geological structures and possible applications for modern construction solutions and investigated means of protecting the mountain railroad from such hazards as avalanches, slides, earthquakes and mud flows.

The unselfish and strenuous work continues. The timetables are strict. The general project designer--the Kavgioprotrans Institute--has to issue its technical documentation within the first six months of this year. The question of how to speed construction of the railroad has forced design personnel to seek new organizational solutions. This has resulted in a detailed composite schedule covering construction preparation and organization and defining general contractor/subcontractor interrelationships. These are many in number at Kavgioprotrans; there are over twenty academic, design and scientific research institutes and organizations located in Tbilisi, Moscow, Leningrad and other cities in this country.

Plans have been made to carry out many surveying/design/construction jobs in parallel rather than sequentially (one after another). This will speed progress on the project's initial stage--completion of the 23-kilometer Pereval'nyy Tunnel. Its construction is slated to begin in 1986. Preparatory structures will be erected during 1985. Engines have already been heard at work in the Targim basin; equipment and material have been transferred here.

Now the work to be carried out includes building roads to both portals, supplying electricity, establishing a commercial/raw materials base and building housing.

This is the general nature of the construction program outlined by the schedule for the next two years. The most important thing is the beginning of its translation into the completion of the design phase and the performance of critical topographic, engineering/geodetic and scientific research work along the right-of-way. This work is distributed as follows:

Last summer the general contractor for design, Kavgioprotrans, headed by L. Kvartskhav, completed field investigations on the most critical central section. Next, working drawings are to be issued.

The Geological Institute imeni A. Dzhanelidze of the Georgian SSR Academy of Sciences continues route surveying in the critical mountainous area. The most critical geodetic surveys at the Pereval'nyy Tunnel are under the supervision of survey party chief Zh. Todua.

Materials are required for construction. Where can these be obtained? It is expensive and illogical to haul them over great distances. For this reason, geologists are also seeking inactive raw material sites. Surveyors have found some materials to be available in quantities which are more than sufficient for the builders' needs. For example, rich sources of sandstone have been found in addition to sites containing limestone, clay, facing stone, etc.

Tunnelers have often been faced with problems of a hydrogeologic, geothermal and even gas-geochemical nature. For the most part these problems involve the Pereval'nyy, Tarskiy and Zhinvali Tunnels. Solutions to these scientific problems are the responsibility of the groups of scientists headed up by B. Zautashvili and G. Buachidze, doctors of geologic sciences, who also take an active part in the work.

A strongpoint of the composite schedule for preparing and organizing construction work is that it assigned specific tasks to the scientific realm. Solutions to these problems are the responsibility of the republic institutes of the Academy of Sciences. These include the institutes for geophysics, mining engineering, aseismicity and construction engineering. A significant volume of work is assigned to the Transcaucasian Hydrometeorology Scientific Research, Moscow Geological Prospecting and Georgian Polytechnical institutes, among others. The shape of the future mountain railroad should be "drawn" through joint efforts.

"Nearly 40 percent of the Caucasus Mountain Railroad will be run in tunnels and galleries, along large and medium bridges and on high retaining walls," states N. Svanishvili, chief project engineer. "The route crosses several mountain river gorges of indescribable beauty. For this reason, designers and builders are faced with the task of protecting these sanctuaries. The structures built here must fit into the natural landscape."

The choice of operational solutions in building the Caucasus Mountain Railroad depends to a great extent on ecological and economical considerations. Scientists from the academic institutions believe that it will be possible to build the survey, transport and ventilation passages to be extended alongside the Pereval'nyy, Zhinvali and Tarskiy Tunnels using special tunneling machines. Here, there is the possibility of using a spray of especially highly resistant concrete instead of reinforced concrete as a cover. The tunnels themselves can be dug using drilling equipment which will allow continuous wide-section boring.

Excavation of rocky soil by means of contour blasting will significantly reduce the volume of work and help to protect the local landscape along the future right-of-way. This will permit the selection of steeper embankment slopes in order to reduce cuts. The slopes will be secured with roof bolting, a technique borrowed from hydraulic construction engineers.

These and other scientific innovations are being implemented on a wide scale in the designs the TsNIIS [Central Scientific Research Institute for Construction] of the Ministry of Transport Construction is preparing for those building the railroad bed.

So-called reinforced earth structures and bank protection construction will be widely used to combat slides, soil creep and erosion. This means that a 15-20 percent reduction in concrete can be achieved through the use of retaining walls, since the construction material now used for these consists of ordinary soil, similar to a layered cake, reinforced with nonwoven materials, fiberglass or other plastics.

River banks can also be stabilized in a very original manner through the use of settling walls. These do not require that cuts be made, thus again the landscape need not be damaged. If this type of wall is undercut by water there is no danger. Their upper portion can be built up (as planned) directly under normal line operating conditions.

Geological and surveying work is not finished in all sectors of the future railroad. The Targim area is one of special complexity. The pathfinder parties in this area are headed by the experienced explorers N. Pozinenko and G. Seturidze. Their collectives are doing everything in their power to completely fulfill the planned surveying program.

"Solutions have been found to many complex surveying and design problems," says O. Kutsiashvili, senior project geologist. Methods have been developed for construction in inclement mountain winter conditions. Climatological data on the region will confirm just how complicated these conditions can be. Here a heavy snow cover reaching a depth of two or more meters can last for six months a year. Possible avalanche zones have been identified and strong artificial structures will be established at those points.

Last year was one of intensive labor for designers and surveyors, as well as for all those participating in preparations for the construction of the Caucasus Mountain Railroad. Many difficult kilometers have been covered in approaching the start of this unique construction project.

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RAIL SYSTEMS

FASTER DEVELOPMENT, CONSTRUCTION OF METRO SYSTEMS URGED

Moscow PRAVDA in Russian 27 Dec 84 p 3

[Article by I. Bordukov, Honored Builder of the RSFSR, Moscow: "The Metro in the City's Life: Problems and Opinions"]

[Text] The country's first subway line, 11.6 kilometers in length, was opened nearly fifty years ago. It was built in a short time under difficult geological conditions and its completion was a major success for domestic construction engineering science and practice. A metro was placed in service in Leningrad in 1955. Five years later one opened in Kiev. Subsequently, planning agencies have considered making provisions in advance for building such lines in other major cities, a fact that has led to major outlays for servicing the population's transportation needs.

According to statistics, an additional 20 cities have crossed the one million population mark in the last 25 years. During peak hours the main lines in these population centers are jammed and cannot keep up with the passenger flow. This has resulted in longer commuting times, especially for those coming from the residential complexes established on the outskirts. Thus, conditions have forced us again to concentrate on the problem of developing subways in major industrial centers.

A decision has been made to lay underground tracks in a number of industrial centers. Metros are under construction in nine cities at this time. The first start-up sections are being driven in five industrial centers and planning documentation is being prepared for an additional 10 cities. However, this construction is not always being carried out with sufficient planning. In several cities the role of the first metro segments was to handle trains carrying people to work. Yet it is known that their main daily traffic load comes from persons engaged in satisfying their everyday necessities.

Obviously it is time to stop hurriedly superimposing metro lines over an established city plan. In every city for which subway construction is planned, a general plan must be used as the basis for developing a system of lines, considering needs for 25-30 years, for which the required land is set aside. This will allow effective reduction of costs involved in tearing down

buildings and structures, strengthening foundations, moving underground utilities and protecting homes from the noise and vibration of trains running in shallow tunnels.

Also important is the advance planning of passenger volumes at future stations, as well as the formation of microrayons within easy pedestrian access and with high-density development, commercial centers and other social and cultural features, including pre-planned general surface transportation routes to carry people to the subway. Just this kind of work should be implemented as soon as possible in Omsk, Perm, Kazan, Chelyabinsk, Odessa, Donetsk, Rostov-na-Donu and other major cities in this country.

It is distressing that some city soviet executive committees sometimes forget the interests of the population. Some lines are being built using the cut-and-cover method, thereby keeping central, highly traveled lines closed to surface traffic for long periods. One example of this occurred in Novosibirsk. The population had to suffer a number of inconveniences caused by the interruption of bus, streetcar and trolley routes. The state's expenditures resulting from this far exceeded the savings gained in construction.

In some cases material, financial and labor savings in construction are obviously fictitious. Station platform lengths in Kiev, Baku and Kharkov allow only five-car trains to be handled. Station escalator access also turned out to be inadequate for the passenger volume. All this led to passenger inconvenience and did not allow full use of line capacity.

A metro is considered an expensive facility. This is true when it is considered solely from the construction point of view. But if we consider that it means a savings in the enormous sums needed for construction and maintenance of main streets, in the course of which many houses must be demolished, and for the development of streetcar, bus and trolley facilities, and, most importantly, reductions in commuting time, it seems the metro is the cheapest form of urban transport. There is a city planning standard for the amount of time permissible for commuting to work. Commuting time should not exceed 40 minutes for 80-90 percent of the population. Each 10-minute period spent in excess of this time, especially in uncomfortable conditions, causes fatigue and results in a 3-4 percent decrease in on-the-job productivity.

According to the five-year plan, by the end of 1985 the total length of subway lines in this country will be nearly 500 kilometers, with Moscow accounting for 220 kilometers. This would seem to be a lot, but these figures could be even higher.

A calculation in one city showed that 2.3 kilometers of subway line were placed in service per year during the 9th Five-Year Plan and 2.1 kilometers during the 10th Five-Year Plan, with a progressive increase in construction costs. The first Minsk Metro start-up section with a length of 9 kilometers was driven in eight years. The pace of construction was similar in Gorkiy, Novosibirsk, Kuybyshev and Sverdlovsk. Indeed, the initial section is still not producing the desired effect. A new line must be driven or the existing one extended. The time required to place a kilometer in service dooms the city-dweller to wait 8 to 10 years, or even more, for a useful subway system.

Without a doubt, capital investments must not be scattered among several projects. Both the population and the state suffer when this is done.

There is an opinion that the slow pace of metro construction is caused by an insufficiently developed technical/production base and a lack of cars, escalators and tubing. These conclusions would have no basis if the problems of developing and strengthening this base were solved in a timely manner.

Thus, conditions urgently insist that subway lines must be built, the pace of construction increased between 1.5- and 2-fold, and solutions provided for all problems involved. The primary matter is to correctly define the times for beginning metro construction and to outline a development plan which considers the special characteristics of the individual city. Thus in Gorkiy, for example, extending the section under construction in the city center across the Oka River would obviously be appropriate, as well as a good basis for a radical solution to the city's transportation problems. A similar solution suggests itself for Sverdlovsk, Kuybyshev and Novosibirsk. They are proceeding correctly in Minsk, having begun the construction of a second metro line from the large and rapidly developing northwestern residential area with its personnel surplus to the downtown area and on to the eastern region where there are many enterprises but few workers. At the same time a transfer connection ought to be built to connect the two lines.

Reducing the cost of metro construction is an important matter. At present, metro tunnels are being built with a internal diameter of 5.1 meters. This is appropriate for Moscow, Kiev, Minsk, Tashkent and Kharkov. But in Omsk, Perm, Rostov-na-Donu, Kazan, Ufa and other cities with population projections on the order of 1.5-2 million inhabitants, this dimension could be reduced slightly. Of course, new drilling technology and rolling stock will be required. Behind all this, however, is one of the most important factors in speeding scientific/technical progress in public transportation servicing: significant savings in financial and material resources, as well as the reduction of construction times. The question deserves the careful attention of specialists.

Now a few words on future metro construction in Moscow. Historical development has been such as to make lines rather concentrated in the city's inner ring, while they are widely separated in the peripheral areas. We would like to refrain from building new metro lines across the Moscow's central section, and equally to avoid forming a second ring. One alternative could be to build new metro lines proceeding tangentially and penetrating deep into the peripheral areas where some 70 percent of the capital's population lives. The capital's main passenger traffic flow is toward the center. Transfers from the ring to the radial lines would increase passenger travel distances by at least 25 percent in contrast to transfers to tangential line stations.

In Moscow and Leningrad there is a need to establish express diameter commuter electric train systems with exits in suburban areas, thereby avoiding overloaded primary stations. At this time it is extremely important to design such systems, in order to plan ahead of time the creation of convenient transfer points for trips to the suburbs from any region of the city, including those from the major terminals and from transfer stations of the Zhdanovskaya Station type.

In conclusion it should be stated that a city's high passenger traffic level cannot be provided by a metro system alone. Energetic efforts must be directed at developing public surface transport resources, including bus and trolley lines, and especially high-speed streetcars.

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RAIL SYSTEMS

PLANS FOR FUTURE EXPANSION OF MOSCOW METRO

Moscow MOSKOVSKAYA PRAVDA in Russian 11 Nov 84 p 2

[Article by Yu. Lapin, chief of the Engineering Equipment and Site Preparation Administration of the GlavAPU [Architectural Planning Main Administration]: "Moscow at the Beginning of the Third Millenium: Capital Transport Carries the Equivalent of 1.5 Times the World's Population"]

[Text] The technical and economic indicators of the new General Plan for the capital's development through the year 2010 have been prepared and approved. Today we continue our publication of materials which discuss how Moscow will look at the beginning of the third millenium.

The rapid pace of life in the capital--one of the most important cities in the world--finds its expression in a transportation indicator. It has now reached the number 760, not counting the number of trips by train and automobile in the city.

There it is, 760 trips a year for every Muscovite! It's easy to see what a burden this puts on the capital's public transportation. On the average, city mass transit resources carry up to 17 million passengers per day, or 6.3 billion people annually--nearly 1.5 times the earth's population.

The Moscow Metro, carrying over 2.4 billion passengers a year, has an especially important role in this enormous task. With the opening of the Serpukhovskaya Line last year, the length of the Moscow Metro reached 200 kilometers.

By the end of the current five-year plan the Moscow Metro will extend an additional 15.5 kilometers. Service to the Chertanovo Rayon will be significantly improved and the Serpukhovskiy Radius will be continued to the city center. The line will be extended from the Polyanka Station to the Borovitskaya Station where an important transfer junction is formed at the intersection of the Kirovsko-Frunzenskaya, Arbatsko-Pokrovskaya and Filevskaya Lines with the Serpukhovskiy Radius. Further, this radius will be extended southward to the Prazhskaya Station, built in cooperation with subway designers and architects from the capital of our fraternal nation Czechoslovakia.

From Kashirskaya Station, construction is proceeding at full speed on extending the Zamoskovoretskaya Line to the major residential rayon of Orekhovo-Borisovo. This section is to be placed in service in two stages: in 1984 the Kantemirovskaya, Lenino and Orekhovo Stations will lead metro trains to the southern edge of the rayon and in 1985 two additional stations, Domodedovskaya and Krasnogvardeyskaya, will be opened.

Also in 1985, the Kalininskaya Line will be extended from the Marksistskaya to the Tret'yakovskaya Stations, and there will be a new transfer point at the Kaluzhsko-Rizhskaya Line and at the Novokuznetskaya Station.

As we can see, the construction sites for the sections to be opened in 1984-85 are primarily located to the capital's south. However, work is already well underway on the construction of the Timiryazevskiy Radius which, together with the Serpukhovskaya Line, will form the longest line, the Timiryazevsko-Serpukhovskaya, cutting completely across Moscow from north to south. From Borovitskaya Station this cross-town line will arrive at Ploshchad' Pushkina. This will form a large transfer junction which will join three metro stations named for great writers--Pushkinskaya, Gor'kovskaya and Chekhovskaya. This is one of the priority sections to be introduced during the 12th Five-Year Plan. The next stage forming the Timiryazevsko-Serpukhovskaya Line will be an extension from Chekhovskaya Station through the Tsvetnoy Bul'var and Mendeleyevskaya Stations (with a transfer to Novoslobodskaya Station) to the Savelovskiy Terminal. Finally, by the end of the 12th Five-Year Plan the Timiryazevskiy radius is scheduled to be extended to the residential Otradnoye Rayon. Eventually it will be continued to the residential Bibirevo and Lianozovo Rayons.

The Zhdanovskaya Line is one of the most heavily traveled routes. Considering new residential construction in the southwestern section of the capital, traffic can be eased by a new cross-town line, the eighth. This line will connect the city center to the northern Degunino-Vagonoremont Rayons and to the southeastern Pechatniki, Lyublino and Marino Rayons.

Construction of this future cross-town line is scheduled to begin during the 12th Five-Year Plan at the first-stage 7-kilometer section from the Kurskaya Station, where a third transfer junction will appear, across the Ploshchad' Il'icha and Ploshchad' Krestyanskoy Zastavy to Sharikopodshipnikovskaya Station. Three of the four stations on this first-stage line will give passengers the opportunity to transfer to existing lines: the Pokrovsko-Arbatskaya, Kol'tsevaya, Kalininskaya and Zhdanovsko-Krasnopresnenskaya. This eighth cross-town line will achieve its full significance during the 13th Five-Year Plan, when it will be extended to the north and southeast.

Metro builders began the first meters of construction extending the Kaluzhskiy Radius to Yasenevo. This 6.7 kilometer line is divided into two start-up sections with four new stations and will add to the attractiveness of the major Yasenevo residential rayon.

Two additional 12th Five-Year Plan projects will take metro trains to distant Moscow rayons. From Preobrazhenskaya Station the Kirovskiy Radius will extend

to Lokomotiv Stadium and further to the Podbel'skaya Street area. From the Molodezhnaya Station an extension is proposed to bring the Filevskiy Radius to the residential Krylatskoye Rayon.

Thus, the volume of new lines to be introduced in the 12th Five-Year Plan is growing to 34 kilometers.

Construction plans for the period up to 1990 call for the development of Moscow's metro radial system by supplementing it with an eighth radial line, as envisioned by the General Plan for development of the capital.

During the final decade of the 20th century, Moscow metro construction will extend to new boundaries. Three basic problems must be solved. First there is the expansion of Moscow passenger transport territory. By the year 2000 the incorporation of reserve metro land should allow decisive expansion beyond the capital's current boundary--the Moscow Ring Highway. Second, travel speeds must be increased to 60-70 km/h. Finally, the third task is to increase the pace of metro construction to 40-45 kilometers per five-year plan.

A continuation of part of the eighth cross-town line is proposed after 1990. The Lyublinskaya Line will be extended southeast to the Lyublino and Marino Rayons. At the same time, the cross-town line will extend across the center of the city with transfer stations at Ploshchad' Turgenevskoy and Ploshchad' Trubnoy, and at Ploshchad' Kommuny in the Sushchevkiy Val Rayon. By 1995 construction will be completed on the Timiryazevskaya Line' Otradnoye-Lianozovo section and on the Zamoskovoretskaya Line' section from the Krasnogvardeyskaya Station to the planned Borisovo industrial zone.

The beginnings of the formation of a new metro system will be authorized. This system can be provisionally called an express line. The first such line will run from Mitino (Krasnogorsk Rayon), through Polezhayevskaya Station, to the southwest of the capital roughly to the area of Sportivnaya or Universitet Stations. Its construction is proposed for the 13th Five-Year Plan. By the end of the century this high-speed route will be turned into a Mitino-Butovo Line leading to the planned central zone of Moscow.

The General Plan for the capital, developed in a scientific-research and design institute and entitled "Plan for the Overall Development of Moscow Transport to the Year 2000", proposes long-term construction of four such express lines and the organization of heavy traffic consisting of 10- to 12-car trains.

The ring lines in Moscow suburbs have not been forgotten. Their routes are being determined at this time in order to better serve the residential complexes which have grown up in the last 15-20 years.

By the year 2000, lines now in service will have to be rebuilt. Additional access to overloaded stations is planned, primarily at stations such as Belorusskaya, Baumanskaya, Komsomol'skaya and others.

The plans before the famed Moscow Metrostroy [Metro Construction] collective are grandiose. At least 120-130 kilometers of new subway lines will have to be placed in service during the 16 years remaining in the 20th century.

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CSO: 1829/140

RAIL SYSTEMS

PLANS FOR 1985 OPENING OF 3RD TBILISI METRO LINE

Tbilisi ZARYA VOSTOKA in Russian 4 Jan 85 p 4

[Interview with Vladimir Gotsiridze [addressed during the interview as Viktor Davydovich Gotsiridze], hero of socialist labor and chief of the Tbiltonnel'stroy Administration, by ZARYA VOSTOKA correspondent Tamara Kesanashvili: "The Metro Boundaries Will Expand"; time and place not given]

[Text] The third phase of the Tbilisi Metro will be put into revenue service in 1985. This ZARYA VOSTOKA correspondent met with the chief of the Tbiltonnel'stroy Administration, Hero of Socialist Labor Vladimir Gotsiridze, and asked him to answer a number of questions.

Correspondent: The Tbilisi Metro will mark its 20th anniversary in 1985. It's difficult today to picture our republic capital without this convenient, fast, reliable and comfortable mode of transportation. What has been done in these 20 years? What has made these years noteworthy for the Georgian metro construction workers?

V. Gotsiridze: Remembering the last 20 years, I can firmly state that they have become for Georgian metro construction workers a university of craftsmanship, working and engineering know-how, innovative experience and scientific organization of labor. Today we can speak with pride about the nature of the Georgian metro construction workers, who have honorably continued the best traditions of the Georgian working class. We can speak of their distinctive approach to metro construction and of the school of Georgian metro construction.

Also, of course, we can speak of the fact that the Tbilisi Metro line has expanded nearly three-fold in these years. In December 1965, the first section (Didube-Rustaveli) of the country's fourth metro was only a little over 6 km long and had only 6 stations. Now, there are 16 stations for Tbilisi residents. The first line of the Tbilisi Metro carried about 20,000-25,000 passengers a day; now the Saburtalo Branch alone serves over 70,000 passengers. Every day, this high-speed mode of transport serves 370,000 Tbilisi residents and guests. I should note that over these years, the metro has become one of the favorite modes of transport in Tbilisi.

Correspondent: Victor Davidovich, many of this newspaper's readers, especially those living near the Tbilisi Electric Locomotive Plant imeni V. I. Lenin [TEVZ] and in the Varketili residential block have been wondering: when will the third phase of the metro be put into service? Tell us, please, what work has already been done in these sections, and what remains to be done?

V. Gotsiridze: Yes, the Tbilstonel'stroy collective is presently working at a very fast pace to construct the third phase of the metro--to the Gldani and Varketili residential blocks. This line will be put into service in two stages: in 1985, the Didube-TEVZ and Samgori-Varketili sections, totalling 6.7 km, will be put into service. In the 12th Five-Year Plan, the 2.4-km-long TEVZ-Gldani section will be put into service. These metro stations will connect the large new Gldani and Varketili residential blocks with downtown Tbilisi and will greatly improve public transportation service. I should add that four stations are being build in the Didube-Gldani section: Grmagele, TEVZ, Avchal'skoye Shosse and Gldani. The escalator tunnels have been built at all of the stations, and escalator installation is now underway.

Recently, the first tunnel connection was completed. The left through tunnel from the Samgori Station was connected with the Varketili Station tunnel. The breakthrough on the Varketili branch is a notable event in the lives of metro construction workers, since it will greatly improve labor productivity and the pace of work. In February of this year, the right through tunnel will break through.

I would like to add that Shaft No 39, whose collective is building the through tunnels, has implemented the direct-flow brigade contract. This makes it possible to say with certainty that the metro construction workers of this section will complete the construction quickly.

Correspondent: Tell us, please, in more detail: what the Grmagele, TEVZ and Varketili Stations, to be completed in 1985, will be like?

V. Gotsiridze: The entire route of the third phase of the Tbilisi Metro will be at a deep level. The specific engineering and geologic conditions determined both the design and the architecture of these stations. The new stations will be single-vaulted, which creates a feeling of spaciousness and lightness. This feature also gives a wide latitude to architectural and decorative design. I must note the recent trend, both in this country and abroad, toward the construction of single-vaulted stations.

An interesting design for the Varketili Station was developed by architect Valeriy Bakhtadze of the Tbilgorproyekt Institute. This station is located at the corner of Dzhavakhetskaya and Khomleli Streets. It is decorated with so-called sphere structures hanging from the ceiling. These are original in design, and give the entire station an illusion of lightness, transparency and light. Multicolored aluminum plates of an original and unusual design will decorate the passageway walls.

The TEVZ Station was designed by architect Niko Lomidze of the Kavgioprotrans Institute. It will be decorated with white Ural and Saliyet marble and granite.

The tunnels and the vestibule have already been completed here.

The plan for the Grmagele Station (located in Sanzon), developed by Kavgioprotrans architect Malkhaza Turkadze, is not only beautiful, but practical. I must note that the best specialists from Soyuzmetrospetsstroy Administration in Moscow are doing all the finishing work.

Correspondent: And the final question, Viktor Davidovich, what are the growth prospects for the Tbilisi Metro?

V. Gotsiridze: According to Tbilisi's general complex transport scheme for the years 1985-2000, Tbilisi's metro will be about 50 kilometers long. There are plans for 19 new stations. A new route is proposed for 1985-1990, from Ploshchad' Rustaveli to Vazisubani, with five stations: Rustaveli-2, Ploshchad' K. Marksa, Zemo-Elia, Kvemo-Elia and Vazisubani. The Saburtalo Branch is to be extended between 1985 and 1990 as well.

Between 1990 and 1995, the line between Ploshchad' Rustaveli and Voyenno-Gruzinskaya Doroga is to be built. It will have six stations: Vake, Politekhnikheskiy Institute, VDNKh, Didube, Digomi and Mion. The general scheme for Tbilisi Metro system development calls for the Vazisubani-Moskovskiy Prospekt and Varketili-II--Vazisubani-II Lines to be extended. It also calls for the construction of the Gldani-Mukhiani Branch. This is the planned development for the Tbilisi Metro over the next 15 years.

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RAIL SYSTEMS

BRIEFS

PROGRESS ON KUYBYSHEV METRO--A beginning has been made on a new phase of work on the right-of-way of the metro which is being built in Kuybyshev: the builders have proceeded to finish up work on the first station on the section under construction, the Kirovskaya Station. This city of a million persons has extended along the bank of the Volga River for almost 40 kilometers. The underground mainline will be called upon to provide a high-speed transport connection between the city's historically formed center and the distant residential areas in its southeastern part. The front of the metro's construction is being expanded. According to the calculations of the specialists, when the first stage of the Kuybyshev Metro is put into operation, its services will be used by 180 million passengers annually. [By Yu. Panfilov] [Text] [Moscow IZVESTIYA in Russian 14 Jan 85 p 1] 2384

VL-15 ELECTRIC LOCO TESTING--The 12-axle VL-15 electric locomotive, built by the Tbilisi Elektrovozostroitel' Production Association, has come out onto the steel mainlines of the Transcaucasian Railroad. This pioneer of a new series of locomotives has no equals with regard to the capacity of its d.c. engine. Now, after plant tests, it must during the course of a month try out its powers on the Transcaucasian Railroad. Then this electric locomotive will be tested in the Urals and on the test track of the All-Union Scientific Research Institute for Railroad Transport near Moscow. This year provisions have been made to turn out a few more such locomotives, and during the 12th Five-Year Plan the VL-15 will be put into serial production. The electric locomotive builders have also begun to produce the VL-10N locomotives, which are designed for operation under severe arctic conditions. [By M. Aydinov] [Text] [Moscow TRUD in Russian 16 Jan 85 p 3] 2384

NEW SPUR FROM TAKHIATASH--Tashkent--Work trains have begun to move along the 40-kilometer Takhiatash--Kunya-Urgench branch. Their passengers have been workers of the pilot repair-and-restoration train No 13 and SMP [Construction-and-Installation Train]-624 of the Sredaztransstroy Trust, as well as honored guests from the capital of Turkmenia and Tashauz Oblast. Thanks to the new spur line, the Kunya-Urgench Rayon has acquired a reliable connection with the region's industrial centers, which will speed up its economic and social development. This was talked about at a meeting which was held on the occasion of the opening of working traffic by the first secretary of the CP of Turkmenia Central Committee, M. G. Gapurov. He congratulated the participants in the construction on their labor victory, handed out to many of them awards and certificates proclaiming their titles of "Honored Builder of the Turkmen SSR."

The builders are confronted with the task of erecting a station in Kunya-Urgench; the plan for it has been developed by the engineers of Tashzheldorproyekt. This building, decorated with ornaments from the renowned Kunya-Urgench carpets, should merge harmoniously with the ensemble of the antique minarets and mausoleums of the ancient city. [By V. Pletinskiy, SREDNEAZIATSKAYA MAGISTRAL' correspondent] [Text] [Moscow GUDOK in Russian 22 Jan 85 p 1/ 2384

NEW DIESEL TRAINS FROM RIGA--Serial production of diesel trains with a new design has been begun by the group at the Riga Railcar Building Works. The first such train has been turned over to the railroaders. In such trains a maximum of conveniences has been created for the passengers and the engineers. The cars have soft, reclining seats, and there is an automatic monitoring of the air temperature. In the cabs of the locomotive engineers there are two heating systems, and there is regulation of the bias lighting on the control panel depending upon the time of day. The economical quality of the trains has also been improved. During free, i.e., unloaded running the revolutions of the power units are automatically reduced, and this will allow us to conserve as much as six tons of fuel per annum. In creating the new model for these trains, the enterprise's group was able to beat the established deadline by almost a year. Individual assemblies and units, as they were manufactured, have been installed on serially produced trains for operational testing. By the end of the year several more new diesel trains will be turned over to the railroaders. [Text] [Moscow GUDOK in Russian 5 Feb 85 p 2/ 2384

SURVEYING FOR KAZAN METRO--Specialists of the Trust for Construction-Engineering surveys have completed the first phase in studying the right-of-way for the underground passenger mainline for the capital of this autonomous republic. During six months of work the surveyors conducted a large amount of investigations. Along the right-of-way of the future metro they made approximately 200 exploratory drill-holes, and they carried out a complex of underground measurements necessary in making the design calculations for this metro's lines and stations. The underground passenger right-of-way for this city of a million persons will stretch for 20 kilometers and will connect the residential areas with the regions of industrial build-up. Twelve intermediate stations will be built here. Development of the plan for the Kazan Metro is being handled by specialists of the Gorkiy Branch of the Metrogiprotrans [State Institute for Planning Metro Transport]. [By M. Zaripov] [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 18 Jan 85 p 1/ 2384

NEW RAILROAD RADIO COMMUNICATIONS--Riga--The ZhR series radio stations have been used for more than a decade in train and shunting communications. Modern semiconductor radio stations have now come to the Baltic. They were evaluated right away. The intensive replacement of the ZhR old-timers with the new equipment is now proceeding on the railroad. Radio communications have already been modernized on all sectors with centralized traffic control. Signalling and communications distance resources are doing the replacement work while the adjustment and tuning is being done by the railroad automation and telemechanics laboratory. The new radio stations are providing fast train calling. [By GUDOK correspondent L. Lyubimov] [Text] [Moscow GUDOK in Russian 19 Jan 85 p 2/ 8524

LENINGRAD-MOSCOW RAILROAD ADDITIONS--In a holiday mood, the railroad workers of the October Railroad yesterday noted yet another of their labor victories in the outgoing year. A new 12-kilometer track between the stations of Tosno and Sablino was laid on the main path of the Leningrad-Moscow Railroad. The mass meeting is ending and the first freight went from Tosno to Leningrad along the new line. The work was completed in a short period of time, a little over two months. The Slavyanka-Obukhovo run, whose opening the railroad workers reported on 19 October, received its addition. The new track will permit an increase in freight shipments and an improvement in passenger and local train schedules. Trains with national economic cargo are at present traveling over this new line and by the beginning of summer it will become the main railroad for local trains on the Leningrad-Tosno route. And for this, as the chief engineer of the railroad's Leningrad-Moscow Division V. V. Malakhov said: "Not wasting time, with the new year we begin the construction of the new sector, Sablino-Popovka, and we will finish it by Victory Day." [By N. Konovalova] [Excerpts] [Leningrad LENINGRADSKAYA PRAVDA in Russian 28 Dec 84 p 2] 8524

NEW TRANS-SIBERIAN RAILROAD SECTOR--Shimanovsk (Amur Oblast)--The new Trans-Siberian Railroad sector, more than 140 kilometers long from Belogorsk to Shimanovsk, was switched to electric current. The first electric locomotives have already traveled over it. An even more intensive program has been undertaken for 1985--to open the way for electric locomotives on a 240-kilometer sector to the station of Magdagachi. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 8 Jan 85 p 1] 8524

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MARITIME AND RIVER FLEETS

MORE TECHNOLOGICAL INNOVATIONS URGED FOR RIVER FLEET

Moscow RECHNOY TRANSPORT in Russian No 9, Sep 84 pp 2-4

[Article by V. Tikhonov, chief of the Technical Administration and Collegium member of the MRF (Ministry of the River Fleet): "Accelerate Scientific and Technical Progress"]

[Text] The successful fulfillment of the tasks set by the 26th CPSU Congress on raising the efficiency of social production and switching the country's economy to a new path of primarily intensive development is closely linked with acceleration of scientific and technical progress and implementation of a unified state scientific and technical policy. The objective necessity of such acceleration has been prepared by the entire preceding development of our country's economy. These tasks were spelled out in the documents of the latest plenums of the CPSU Central Committee, in resolutions of the CPSU Central Committee and especially in the resolution of the CPSU Central Committee and the USSR Council of Ministers "On Measures for Accelerating Scientific and Technical Progress in the National Economy," which was adopted in August 1983.

Broad introduction of scientific and technical progress achievements in practical work activity of river transportation has contributed to further development of its material and technical base and raising its role in service to the national economy and has ensured an increase in the volume of cargo shipments.

With the growth in the past 10 years in the volume of cargo shipments by 51 percent and of cargo turnover by 45 percent, the number of workers in river transportation increased by 10 percent. The volume of cargo handling operations in the same period increased almost twofold and the number of port workers by 28 percent. With the growth of gross production in industry by 54 percent, the number of workers increased by only 2.4 percent.

Such results were achieved to a considerable extent owing to introduction of new equipment, progressive technology and leading work methods, which was promoted by the work of production innovators, scientists, designers and technologists of enterprises and organizations of the sector.

The transport and dredging fleet continued to be replenished with modern highly efficient vessels. The replenishment with new vessels amounted with respect to cargo motorships to 28 percent, pusher tugs to 34 percent and the non-self-propelled cargo fleet to 37 percent.

The motorships of new design "Dmitriy Furmanov," "Sergey Yesenin," "Moskovskiy" and "Luch" joined the passenger fleet.

Highly productive hydromechanical means for loading and unloading mineral and construction materials were designed for ports on the basis of research and design developments. The number of cranes per standard berth (100 m) has reached 2.25 units. Complexes have been established for transshipment of apatites and highly productive devices for unloading grain, handling containers and others are being put into operation. The level of comprehensive mechanization in loading and unloading package and piece cargo increased to 92 percent.

Along with organization of new production, industrial enterprises were fitted out with new equipment, including machines with numerical programmed control and highly productive gas cutting machines. A total of 37 mechanized and flow lines have been installed in shipbuilding and machine building shops. Enterprises receive more than 4,500 units of means of small-scale mechanization annually, including 1,600 units manufactured at plants of the sector.

The level of comprehensive mechanization in industry has increased to 39.9 percent as a result of introduction of progressive technology and mechanization of labor-consuming work.

The work aimed at raising the quality of manufactured goods is being continued. At the present time, 17 articles were awarded the mark of quality.

The material and technical base of the ASU [automated control system] is being expanded. The first stages of 17 automated control systems of shipping companies and ports have been developed and introduced. Positive results have been gained from scientific and technical cooperation of the Minrechflot [Ministry of the River Fleet] with the GDR Ministry of Transportation, the CSSR Ministry of General Machine Building, the Wärtsilä A/O [Joint-Stock Company] and other organizations abroad.

Innovators and inventors are actively participating in solving the tasks facing river transportation. During 3 years of the 11th Five-Year Plan, the economic effect from introduction of inventions and innovations has increased by 17.5 percent compared with a similar period of the past five-year plan.

In 1981-83, a conventional economic effect of more than R120 million was obtained from introduction of scientific and technical progress measures.

The basis of scientific and technical progress is organization of scientific research work and introduction of its results in production. Scientific research and experimental design work in our sector are being performed by TsNIIEVT [not further identified], educational and planning institutes, the TsKB [Central Design Bureau] and computer centers. More than 2,000 specialists are engaged in this work, including 74 doctors of sciences and 720 candidates of sciences. Lately, specialization of institutes has been made more precise. Work aimed at acceleration of scientific and technical progress is being conducted in 17 directions in accordance with long-range and annual plans for the development of science and technology. In 1984, institutes and the Central Design Bureau

simultaneously with current research are fulfilling perspective work according to state subject matter, whose volume exceeds 22 percent. Transition to special programmed methods in planning scientific research work is being implemented. For the purpose of implementing a unified scientific and technical policy, the principle of centralized formation of plans and fulfillment of work according to agreements with main administrations and administrations of the ministry has been established and is in force.

Institutes and the Central Design Bureau have carried out some very important research and developments, whose results have been introduced in production.

A long-range comprehensive program for the development of river transportation of the RSFSR to the year 2000 and a comprehensive scientific and technical program for 1981-85 and the period to 1990 have been developed, research aimed at raising efficiency in utilization of material and fuel and power resources has been fulfilled and a new network of types of transport vessels has been formed. The GIIVT [Gorkiy Institute of Water Transportation Engineers] and the LIIVT [Leningrad Institute of Water Transportation] have fulfilled a complex of research in the field of prolonging navigation. The economic effect from introduction of the institutes' research in production amounts to an average of R3.4 per R1 of expenditures.

At the same time, it should be noted that in using the sector's scientific and technical potential and accelerating introduction of research results in production there are serious shortcomings. Many major problems are still unsolved in the field of economics (especially in studying cargo flows) and development and operation of the fleet, ports, industrial enterprises and other units of river transportation. Work is being conducted unsatisfactorily in raising the intensity of cargo handling work and the level of utilization of existing equipment and comprehensive development of river transportation facilities.

Realization of these tasks is unthinkable without radically improving the activity of scientific and planning and design organizations, substantially deepening cooperation of science with production and raising the quality of planning.

Analysis indicates that organization of scientific research and its effectiveness still does not meet contemporary requirements. Major shortcomings occur, first of all, during planning of scientific research and experimental design work (NIOKR). In forming annual and five-year plans the need to study long-range problems is often not taken into account and facts exist when supervisors of institutes in forming scientific research plans direct their efforts not as much toward the need to solve most important and urgent tasks of river transportation development as toward established specialization of scientific subdivisions, and in some instances also toward scientific interests of individual scientists.

Among shortcomings we should note the poor intermediate control, which is conducted by administrations of the ministry and other client organizations over the progress in doing research, which leads to reduction of quality, extension of periods and delays in introducing its results in production.

Great oversights are permitted in defining the goal and in formulating the task in technical assignments on conducting research. As a result, this leads to vague technical solutions and general recommendations.

In some cases the examination of work fulfilled by institutes and design organizations is delayed for a long time by clients.

Introduction of scientific and technical achievements in production is still the greatest bottleneck. Realization of individual research results drags out for many years. Thus, despite existence of substantiated scientific recommendations, the volume of shipments in large cargo capacity components continues to grow slowly as before at the Lena United and Yenisey and Kama shipping companies and practical solution of questions connected with switching to highly productive continuous action transshipment equipment in ports has dragged out for a long time; the progressive technology of modular shipbuilding, centralized manufacture of unitized ship units and standard sets of products is being introduced extremely slowly. Mechanized shipbuilding production lines at the Shipbuilding Yard imeni Komsomol'skaya Pravda are being used poorly. The progressive organization of navigational repairs based on the experience of the Togliatti SRMZ [Shipbuilding and Machinery Plant] has not gained a broad practical dissemination.

The realization of scientific and technical progress results requires particular attention in shipbuilding. Models of some vessels of new design, which have been tested and have proven themselves, are not being placed in series production. For example, such is the situation with the component motorship for small rivers, which is equipped with a bending device (project R143), and the output of motorships of projects Nos R-168 and R-162 and some others is being increased slowly. It cannot be regarded as normal that further development of high-speed hydrofoils has slowed down owing to a delay in mastering production of new diesels.

Research in the field of environmental protection is increasing considerably in the current five-year plan. However, the results of work fulfilled earlier are being introduced far from in the full volume. Floating enclosures, a non-self-propelled oil trap, a self-propelled oil clean sweep device and a device for collecting petroleum products from water surface, which were developed by the ATsKB [not further identified] and received positive appraisals during tests, have been accepted for introduction but have either not been introduced in production at all or are manufactured in an insufficient quantity.

After prolonged work in 1981, the Leningrad Institute of Water Transportation and the SZRP [Northwestern River Shipping Company] jointly with the GTsKB [not further identified] have manufactured an experimental model of a device for cleaning sewage of passenger vessels. The extremely necessary water safeguarding equipment has passed tests, was approved by control organs and recommended for series production. In 1983, the mastery of these devices was included in the new equipment plan. However, the Northwestern River Shipping Company has failed to ensure manufacture even of a single series model.

At present, as never before, science is faced with the task of considerably raising actual effectiveness and social significance of research and develop-

ment results. Plans must primarily include work which provides a high economic effect or has a substantial effect on improvement of work conditions and on prevention of environmental pollution. However, insufficient attention is still being devoted to this question by scientific organizations and client administrations.

Work aimed at taking into account the economic effectiveness from introducing research is poorly organized in institutes and even in administrations of the ministry. A check conducted by the ministry has indicated that for some research, which was introduced in production, economic effectiveness is not being confirmed by organizations and enterprises. It was also established that economic effectiveness as a whole for a scientific research organization and for individual work is not being defined during the stage of development of a plan for scientific research and experimental work; most agreements do not contain appropriate assignments.

During the current five-year plan, the sector plans to implement more than 30 measures on introducing progressive technology and mechanizing and automating production processes and to create 11 types of new industrial production.

The basic tasks for introducing new equipment are being fulfilled, but realization of some of the planned measures is being implemented with delay. The tasks for increasing shipments of cargo in packages are left unfulfilled year after year. The capacities of complexes for transshipment of apatites are being used only 86 percent, and the level of utilization of capacities at the Astrakhan complex does not exceed 50 percent. Industrial enterprises have not been fulfilling some assignments for the output of new models of production.

A difficult situation has developed this year with regards to fulfilling the state plan for hauling cargo. It is especially important under these conditions to ensure utilization of the most effective measures on introducing new equipment and progressive technology. However, these possibilities are not being used: assignments for hauling cargo in large cargo capacity components are not being fulfilled by the West Siberian, Kama and Volgotanker Shipping Companies, for hauling cargo in packages and containers by the Ob'-Irtysh United, East Siberian and West Siberian Shipping Companies and for hauling apatites by the White Sea-Onega, Northwestern and the Volga United Shipping Companies.

Additional tasks, which were increased over the plan for the 5-year period, for introducing most progressive measures have been established for 1984: for hauling cargo in large cargo components by 5 percent, in forced bending components by 21 percent, in vessels of mixed river-sea shipping by 7.6 percent and in large capacity containers by 7.8 percent.

At the present time, a new five-year plan for the development and introduction of new equipment for 1986-90 is being worked out. Proposals to the draft of basic directions for 1986-90 and to the year 2000 have already been developed and approved by the collegium of the ministry. It is planned to increase the volume of cargo haulage by progressive methods: by the group method in large

cargo components, in an extended period of navigation. Altogether it is planned to fulfill tens of assignments and to master hundreds of types of new production at enterprises of the ministry.

It is planned to design modern vessels of increased cargo carrying capacity in the forthcoming five-year plan. Included among them are the II-SP class motorships with a cargo carrying capacity of 4,000 t, oil and ore carriers of same carrying capacity and mixed navigation vessels with hoist cabins. Planning of some systematized vessels for shallow depth rivers is underway. Included among them are pusher tugs with a capacity of 110-220 kW, cargo motorships with a carrying capacity of 300-800 t and 200-2,000 t barges, in this case the latter will be built from standard modular units.

One of the basic measures is development and introduction in river transportation of progressive-technological cargo hauling systems. At the present time, under the supervision of the GKNT [State Committee for Science and Technology] and the USSR Gosplan, an all-union scientific and technical program is being developed, which provides for corresponding assignments to all ministries and departments that participate in designing transportation means and in hauling cargo. Included in the systems being developed are hauling of vegetable and melon crops, cargo and passengers on small rivers and cargo on SP [combined river-sea] vessels of increased carrying capacity.

Introduction of the transportation and technological systems envisages comprehensive solution of all questions and obtaining final results in the form of increased volume of hauling and improved work indicators of the fleet and ports. Thus, for introducing transportation and technological systems in hauling vegetable and melon crops it is provided to construct 90 specialized vegetable carriers, to manufacture vegetable containers and to construct berths as well as some other measures. It is provided that the following participate in the realization of the aforementioned system: the Minsudprom [Ministry of the Shipbuilding Industry], the Minvneshnetorg [Ministry of Foreign Trade], the Minplodoovoshchkhov [Ministry of the Fruit and Vegetable Industry], Minsel'khov [Ministry of Agriculture], the Mintorg [Ministry of Trade] and the Rospotrebsoyuz [Union of Consumers' Societies of the RSFSR] so that a truly comprehensive solution of the problem is ensured.

Individual important questions of fleet development are being solved slowly. Thus, despite existing technical studies, construction of vessels for lighter hauling systems, of motorships for hauling motor vehicles and of some other types of specialized vessels has not been assigned.

Demands are being constantly and completely correctly voiced about construction of motorships with smaller crews. There are technical possibilities for designing such vessels. However, they cannot be used for the time being, since automated vessels require highly skilled service and consequently must be staffed by suitable specialists. Moreover, their operation is impossible without well organized repair and technical service by coastal production sectors of ship repair enterprises and the fleet repair and operations base. For this purpose it is also necessary to improve in a radical manner all types

of services for the fleet in ports, to reorganize the system of these services and to strengthen appropriate services both quantitatively and qualitatively. These questions have not been solved so far, operation of highly automated motorships is practically impossible.

Realization of that which has been planned is underway. Thus, the motorships with a carrying capacity of 1,400-2,000 t, which will be built in Finland, will be provided for the first time with an automation volume of the propulsion unit that will make it possible to serve a vessel with a crew whose number will be reduced by 20 percent.

As before, among one of the most important directions of scientific research is the work connected with organization of transshipment operations in ports and creation and improvement of technical means of comprehensive automation and mechanization. Institutes and the Central Design Bureau have done some research and studies in this field. However, their results and effectiveness cannot be recognized as satisfactory. Intensiveness in the processing of vessels in ports is growing slowly and essentially does not affect the reduction of their layovers. In March this year, the collegium of the ministry examined this question in particular and set new tasks for intensification of cargo handling operations. In this connection the designing of new highly productive equipment should be accelerated, including hydraulic transloaders, container transloaders with a lifting capacity of 32 t, more improved gripping devices and other machines and devices.

Great tasks must be solved in the field of raising the degree of labor mechanization. The problem of reducing the use of manual labor in all spheres of river transportation activity is one of the most acute and purposeful work is needed in solving it. As indicated by the results of manual labor registration, almost two-thirds of all those working in the fleet and ports and at industrial enterprises are employed in it.

The Ministry of the River Fleet is developing a comprehensive program on reducing the use of manual and hard physical labor for the 12th Five-Year Plan and the period up to the year 2000. At the present time, the first stage of this work has been completed. The implementation of measures provided by the program will make it possible to reduce the share of manual labor in the sector from 64.7 to 41.3 percent. Studies indicate that nearly 40 types of standard and special robots can be employed in ports and industrial enterprises.

The task consists in making indicators of the program more precise during the process of its further development and bringing the expenditures for fulfillment of the outlined measures in accord with real resources, which will be provided by plans for development of the sector in the long-term.

Major research and introduction of its results are to be fulfilled in the field of waterway facilities, environmental protection, introduction of automated control systems and comprehensive work quality control system.

Active organizational work is ahead for realization of the outlined plans for the development and introduction of new equipment and acceleration of scientific and technical progress.

Transition to special programmed planning of scientific research and experimental design work and organization of development and realization of most important purposeful scientific and technical programs should be implemented. In this connection work is now underway on six sectorial programs.

Much must be done in implementing the conversion of enterprises and scientific institutions of the ministry to the new cost accounting work system in designing, mastering and introducing new equipment. As of 1987, the material well-being of institutes and scientists will depend on actual effectiveness of research confirmed by clients.

It is planned to carry out measures aimed at improving, further developing and equipping the testing and experimental plants of educational institutions and the Central Design Bureau and organizing production in them of primarily pilot models of new equipment by reducing the output volume of series production.

In 1984-85, normative periods for renewing (modernizing) machine building production will be developed and introduced and a new order will be established for certification of industrial production according to two categories of quality.

Realization of the outlined measures will make it possible to accelerate scientific and technical progress of river transportation in the Russian Federation.

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MARITIME AND RIVER FLEETS

AUTOMATED SHIP TRAFFIC CONTROL SYSTEM AT ILLICHEVSK PORT

Moscow MORSKOY FLOT in Russian No 11, Nov 84 pp 34-35

[Article by A. Tret'yak, deputy chief of the Black Sea Shipping Company and Hero of Socialist Labor: "With the Aid of the 'Briz-1609-UDS' System"]

[Text] A Briz-1609-UDS system has been used at the Ilichevsk port since 1981 as an automated coastal radar ship traffic control system (UDS). It ensures ship traffic control in the approach zone to the ports of Odessa, Ilichevsk, Yuzhnyy, Nikolayev and Kherson and produces recommendations on safe navigation.

Shipping in the northwestern part of the Black Sea is characterized by high intensity of traffic. From 30 to 40 transport ships are in motion here at the same time. Among them are ships carrying dangerous cargo. The numerous foreign ships arriving here require many more recommendations for safe navigation than domestic ones.

The Briz-1609-UDS system ensures continuous control over fulfillment of international navigation regulations in separate traffic systems and makes it possible for the coastal traffic control service to rapidly discover violations of navigation procedures and intervene immediately to eliminate them.

Unlike ordinary radar stations used for ship traffic control purposes, the Briz-1609-UDS system performs automatic and manual entry into a computer of the detected ships' coordinate for the purpose of their further escort and control, computes traffic parameters of the escorted ships (course and speed) and displays them on the screen in vector and numerical mode, and also displays a map of the approach zone to the ports of Ilichevsk, Odessa and Yuzhnyy.

It automatically detects a ship which has violated traffic procedures prescribed by navigation rules, and in this case the light and sound alarms are switched on and the velocity vector of the ship-violator is displayed by a dotted line on the screen.

The system automatically fixes and maps out on a digital board the data on ships which are in the control zone: the extent and direction of deviation from the traffic zone, the distance and time of movement to the turning point and the angle between the ship's movement direction and the zone's center line.

It automatically determines the danger of collision of two approaching ships, and in this case the danger is determined according to the following rule: the ships are in danger of collision if the distance of the shortest convergence between them and the time of convergence are smaller than the magnitude assigned by a pilot-operator. The conflicting ships are displayed on the screen by flickering of their vectors.

Utilization of the Briz-1609-UDS complex has made it possible in 1981-82 to fulfill safe piloting to the ports of Ilichevsk, Odessa, Yuzhnyy, Nikolayev and Kherson of more than 24,000 ships, including almost 2,000 ships in fog and more than 400 ships without a pilot aboard, and in the process possible consequences of nearly 500 violations were averted.

The accumulated work experience of the ship traffic control system and interaction with the station in Yuzhnyy port have made it possible to eliminate compulsory piloting of Soviet ships to Berezan Island, and this has made it possible to improve the quality of pilot service on the most important section of the Bug-Dnepr-estuary canal. The economic effect from utilization of the Briz-1609-UDS complex exceeds R1 million a year.

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MARITIME AND RIVER FLEETS

FEATURES OF FINNISH-BUILT 'LENINGRADSKIY-1' SUCTION DREDGER

Moscow RECHNOY TRANSPORT in Russian No 9, Sep 84 p 4

[Article: "New Suction Dredger"]

[Text] In May this year, the suction dredger "Leningraskiy-1," which was built on the order of the V/O Sudoimport [All-Union Association for the Import of Ships] for the Ministry of the River Fleet, was commissioned at the Wärtsilä Joint-Stock Company in Turku. It was turned over to Leningrad's Zapadnyy Port and is designed for excavation of building sand in the Gulf of Finland. Its productivity is 3,000 m³ per hour at a depth of 4-30 m.

The "Leningradskiy-1" is a single deck vessel. The living quarters, the wheel-house and the soil scooping operations control post are located in the bow section of the vessel and the soil scooping equipment in the stern section (in the recess of the hull).

The suction dredge has a foreward paddle steering mechanism.

The soil scooping operations are conducted with the aid of dragging (during a speed of 3 knots) or fixed soil collectors. Hydraulic crumbling of the soil is used to form pulp. The sand is loaded on barges via pipes.

Automation of the anchor-handling gear positioning system and remote control make it possible for one man to perform soil scooping operations.

Technical Features of the Suction Dredger

Length	98 m
Width	16.3 m
Draft	3.5 m
Deadweight	1,400 t
Speed	8 knots
Overcall capacity of the propulsion unit.....	6,800 kW
	(4X12V22HF Wärtsilä-Vaasa)

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MARITIME AND RIVER FLEETS

NEW POLISH-BUILT REEFER SHIP 'KURSK' PROFILED

Moscow MORSKOY FLOT in Russian No 10, Oct 84 pp 41-46

[Article by L. Dvorovenko, chief of the technical department of the Latvian Shipping Company: "The Reefer 'Kursk'"]

[Text] At the beginning of 1984, the fleet of the Latvian Shipping Company was supplemented by the reefer "Kursk"--the first of a new series of vessels built for our country by the Shipyard imeni V.I. Lenin at Gdansk (PNR) [Polish People's Republic]. The vessel is designed to transport bananas, citrus fruits, frozen meat, oil and other cargoes in a refrigerated or frozen state, for the preservation of which controlled temperatures are required in the holds during transport. The vessel is also adaptable for transporting passenger vehicles and loads in containers with the international standard type 1C and 1A, including refrigerated ones of the 1C type, equipped with automatic refrigeration units hooked up to the vessel's power supply system.

Basic Specifications of the Vessel

Length:

Greatest	146.3 M
Between perpendiculars	134.0 M

Breadth, greatest	21.4 M
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Molded depth	12.4 M
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Draft:

Load Line	8.15 M
Specification	6.75 M

Deadweight:

With 8.15 M draft	7496 tons
" 6.75 M "	4650 tons

Tonnage:

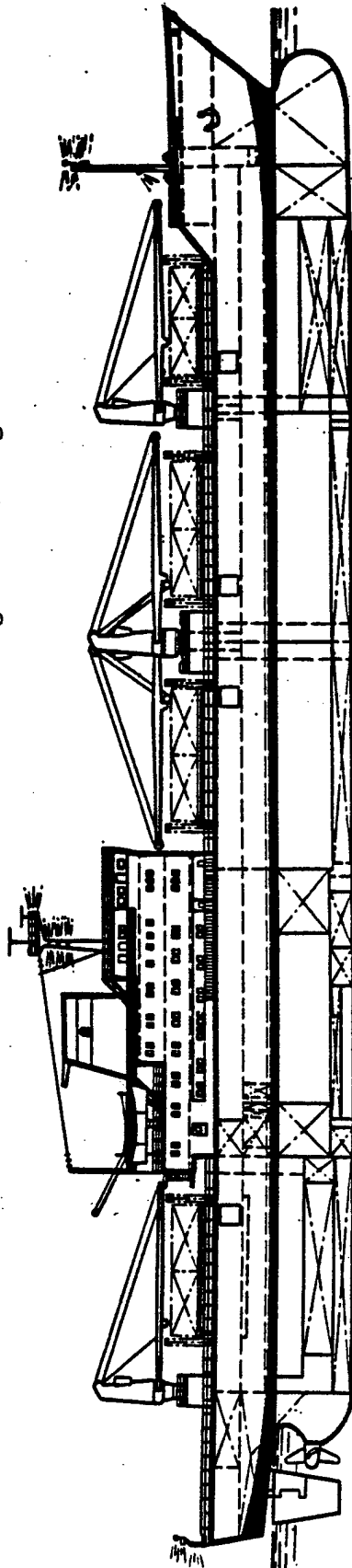
Gross tonnage	8792 registered tons
Net tonnage	4210 registered tons

Cargo capacity	9250 M ³
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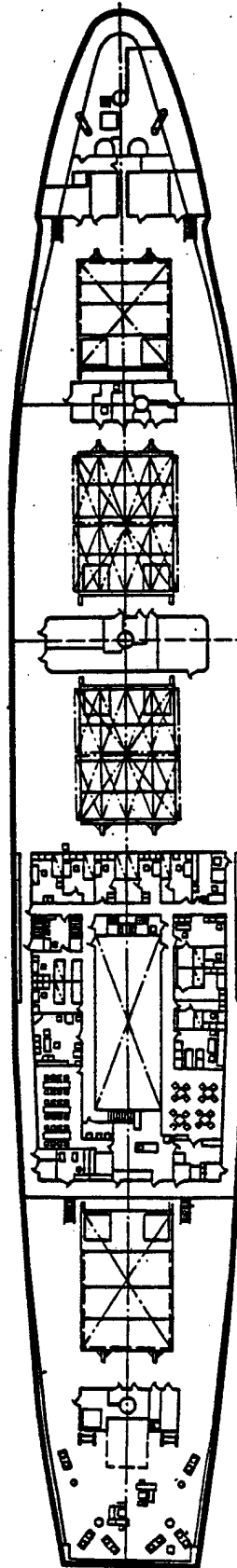
Main engine power	12.3 Mw (16,800 hp)
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Loaded speed with draft 8.15 M	21.8 knots
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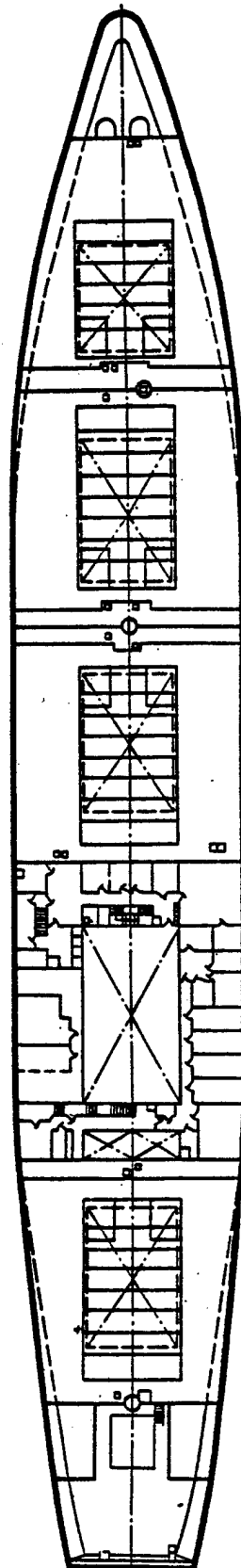
General Arrangement Drawing of Vessel



Side view



Upper Deck



Second Deck

The ship's sailing area is unlimited. It can operate normally at an exterior temperature from +40 to -25°C and of seawater--from +32 to 0°C. The fuel reserve ensures a cruising distance of 12,000 miles. It has a potential of supplementing the fuel and oil reserves to increase the cruising range to 16,000 miles. The cruising stayability with respect to drinking water is 40 days, and with respect to provisions--60 days.

The vessel was built in accordance with the USSR Registry Rules, in consideration of international convention requirements and the national rules for class KM Ⓢ L2 Ⓢ A2 (reefer) and refrigeration unit--for class--X Ⓢ +.

The "Kursk" is a single-screw, four-deck motorship with an extra freeboard, a short forecastle, transom stern, bulb-shaped fore and aft extremities, location of the engine-room and four-tier superstructure shifted to the stern from midship (intermediate between holds Nos 3 and 4). The vessel has two load lines: excess freeboard and tonnage (specificational).

The fully welded structure of the vessel's hull was made according to a combination framing: the upper deck and the double-hulled bottom were assembled along a longitudinal system; side, bottom, second, third and fourth decks--laterally. Six transverse watertight bulkheads make up the vessel's hull, on the basis of the fore peak, four cargo holds, the engine room and after peak. The second deck in all the holds and the fourth deck in holds Nos 2 and 3 are made from shaped steel in the form of a grid (lattice). The third, consolidated deck separates each hold into 2 independent temperature zones (double and single-tier).

The dimensions of the cargo hatches (clear) are in holds Nos 2, 3 and 4--12.4X8.2 M, in hold No 1--9.5X8.2, on the third deck in hold No 1--4.6X8.2 and in hold No 4--6.4X8.2 M. All the cargo hatches are equipped with covers of the "Folding" type, with hydraulic drive. The covers of the cargo hatches on the upper and third decks are made watertight with thermo-insulation covers, and on the second and fourth decks--with grid (lattice) ones. The structure of the hatch covers permits loading equipment to work on them at all the 'tween-decks. At the covers of the vessel's hatches, on all the decks are access holes, designed for installing through them elevators (bucket elevators) for cargo operations. To ensure combined procedures of the vessel's cargo processing, at each hold on the second deck level, there are cargo ports measuring in the clear 1.59X1.87 M along both sides, equipped with hydraulic-drive covers.

There are special sockets welded on the upper deck and cargo hatch covers and in the holds on the flooring of the double bottom plating (in the clearance of the hatches) to secure the containers. The ship can be loaded with 103 containers (20-foot) weighing up to 20 tons each, including 43 containers placed in a single tier on the upper deck and hatch covers. A load of 16 refrigerator containers can be placed on the hatch covers of holds Nos 2 and 3. All the vessel's decks have permanent parts for securing passenger vehicles.

The total number of containers and motor vehicles accepted for transport on the vessel, their weight and placement are determined by the conditions for ensuring the vessel's equilibrium. All the cargo spaces have protective insulation. The insulation materials on the flooring of the double bottom plating are foam glass, foam plastic sheets made of reinforced polystyrene (styrofoam), on which is set a layer of bitumen board, with asphalt poured on top, and a layer of reinforced concrete panels. The sides, bulkheads and deckheads of the upper and third decks are insulated with light polystyrene sheets, covered with bitumen board and faced above with aluminum sheets 1-1.5 mm thick. The aluminum sheets are placed overlapping, with the seams sealed with a special mastic of the MRO type, ensuring the watertightness of the insulation lining. There is a system to drain the condensate from under the insulation layer to the sumps of the ship's pumping arrangement.

Removable latticed platforms (gratings) are secured on all the continuous decks and watertight hatch covers to form conduits through which cooled air is fed into the cargo space, and the insulation materials are protected from damage. The two layers of rows of pine beams, from which the grating is made, are placed at right angles to each other; perforated aluminum sheets 1 mm thick are placed between them for equal distribution of the forced flow of air in the cargo facilities. The upper rows of gratings are made from beams measuring 120 X 42 mm. The strength of the insulating cover for the deck flooring and construction of the gratings are calculated for a uniformly distributed pressure of 200 MPa (2 ton-force/cm²) and operation of the freight handling equipment with a load of 50 kH (5 ton-force) on the front axle (four wheels with pneumatic tires).

The air coolers and ventilators placed in all the holds are separated from the cargo space by partitions made of sheet aluminum with an assembly made of galvanized channel and rubber liners between them. There are special descent shafts, shut off from the air coolers by a steel grid, for access to the air coolers from the upper deck when the holds are loaded.

The permissible specific load capacity of the specificational cargoes (bananas) is 3.0 M³/ton, and of other cargoes--up to 1.8 M³/ton.

The main refrigeration unit (GKhU) with indirect action ensures cooling of the cargoes being transported and maintenance in the holds of the assigned temperature and humidity parameters. The holds are cooled by air conditioning. The main refrigeration unit consists of four automatic refrigeration assemblies with a total refrigerating capacity of 1,700,000 kcal/hour (at evaporation temperatures of -5°C and condensation temperatures of +40°C). One of the units is a reserve. The main refrigerating unit ensures maintaining a temperature in the holds from +15 to -25°C. When four units are in operation to cool bananas with a pulp temperature of +28°C received as cargo on the vessel, the transport temperature of +12°C is reached in the course of 48 hours from the time that the loading was completed.

Khladon-22 is used as the primary refrigerant in the unit, and a water solution of calcium chloride with a density of 1.265 g/cm^3 is the intermediate coolant.

Each refrigeration unit contains a screw compressor type S3-900/IV from the Kyulavtomat firm (GDR), a shell-and-tube condenser with a heat exchange surface of 160 M^2 , a receiver, a khladon type ODU-10-60 dryer with an adsorbent capacity of 10 liters and a dry-type shell-and-tube double-section with a heat-exchange surface of about 200 M^2 .

In addition to the four evaporation-refrigerators for the brine, the GKhu brine system has four centrifugal horizontal pumps with a feed of $210 \text{ M}^3/\text{hour}$ with a pressure of 38 M water column, including one reserve; two brine heaters with a heating surface of 4.5 M^2 each, operating with saturated steam at a pressure of 0.3 MPa; a compensation tank with a volume of 1.6 M^3 , equipped with remote level indicator; 28 air coolers with a total heat exchange surface of 8550 M^2 , installed in the holds in each temperature zone. There is a 0.45 M^3 tank to prepare the brine, located along with the compensation tank in a separate place in the superstructure. The brine system includes a center regulating the brine feed into the air coolers. It maintains two temperature regimes simultaneously in each hold, as well as regular warming of the air. Eight different temperature regimes can be ensured in all on the vessel.

Each temperature zone is equipped with an automatic system for forced circulation of the cooled air, forced from below through the gratings and sucked up into the upper part of the cargo facilities. Cold air is fed in holds Nos 1 and 4 along the vessel's axis, and in holds Nos 2 and 3--according to the Robson system. Some 56 axial two-speed ventilators of the WOMS type with various modifications (PNR) have been installed to ensure forced circulation of cooled air in all the holds. The air ventilation system in the holds ensures a 90-fold exchange of air an hour (relative to the volume of empty holds).

A plenum-exhaust ventilation system, including eight axial two-speed ventilators (two to each hold), installed in the crane house on the upper deck ensures regular air change in the holds when the cargo is transferred into them. The conduits for the plenum-exhaust ventilation are equipped with regulating dampers and watertight covers for the input and output openings. The plenum ventilation system has also been adapted to ozonize the cargo facilities in order to destroy microorganisms in them and eliminate foreign odors. Eight ozone generators type OG-21 (two for each hold) produce the necessary amount of ozone.

The refrigerating capacity of the GKhu and temperature control in the cargo facilities are regulated automatically, but can also be controlled manually. The productivity of the screw compressors is regulated within a range of 10 to 100 percent, depending on the assigned temperature of the brine. The air temperature in the holds is controlled automatically through changing the brine feed by means of regulators of the Sauter firm (Switzerland), which affect the electrical drive of the three-way valves installed in the brine pipeline in the holds. The air temperature in the holds is regulated with

a precision of $\pm 0.2^{\circ}\text{C}$ with fruit transport and $\pm 1^{\circ}\text{C}$ for frozen cargo. The hold temperature is measured by remote control by means of temperature sensitive elements using Honeywell (USA) temperature recorders and a push-button measurement station. The temperature recorders register the air temperature readings in the hold before the air coolers and after them, as well as the readings of temperature sensitive elements placed throughout the entire volume of holds (a total of 55 points). Readings from 32 temperature receivers in the holds, including those from each hold from a single general receiver, are revealed at the measurement station in front of the air coolers and also from two receivers in back of the air coolers.

The GKbU mechanisms and apparatus are placed in the two-tier refrigerator section located along the starboard side in the engine room area. The second tier space for the refrigeration section, in which the evaporators, brine pumps, brine distribution station and pneumatic valves are located, is insulated with styrene foam and has an emergency exit.

Also placed in the refrigerator section are mechanisms and apparatus for the direct action auxiliary refrigeration units: compressor-condenser unit type S3-315, with a refrigerating capacity of 280,000 kcal/hour (at a temperature of $+5/+40^{\circ}\text{C}$), serving the system for the living and staff facilities; a compressor-condenser unit type 3W92SR with a refrigerating capacity of 63,000 kcal/hour (at a temperature of $+5/+40^{\circ}\text{C}$), designed for the air conditioning system of the TsPU [central control point], and two units type 3W92SR, each with a refrigerating capacity of 11,000 kcal/hour (at a temperature of $-27/+40^{\circ}\text{C}$), ensuring the generation and maintenance of the necessary temperature conditions in the vessel's provision storerooms. The auxiliary refrigeration units operate under the given conditions and are automatically controlled.

All the devices for remote measurement of the temperature, relative humidity in the holds, their carbon dioxide content, the means of remote control of the mechanisms and apparatus of the main and auxiliary refrigeration units and the components of the alarm and warning signalling of a disruption in the assigned conditions and malfunctions in the refrigerating units are located at the TsPU. The coordinated alarm and warning signalling is relayed to the refrigeration mechanic's cabin.

The main engine on the vessel is: 9-cylinder, two-stroke crosshead, directly reversible, with twin gas turbine drives, type VTP-631, diesel type 9K67GFC, manufactured for the first time by the Gdansk Shipyard imeni V.I. Lenin under license from the firm MAN--Burmeister and Wain. The maximum sustained capacity of the engine is 12,356 kw (16,800 hp), with a rotational frequency of 145 rpm. Characteristic features of the engine are hydraulic opening of the exhaust valves and use on them of carousel springs, a hydraulic method for reversing the camshaft, crosshead bearings in thin-walled bushings, an additional packing ring in the upper portion of the piston rod glands, gas storage cells behind the gas turbine drives and use of a hydraulic system to release the nuts of the cylinder heads. The engine has been adapted for operation on all types of fuel with a viscosity up to 3600 from Redvud 1 at 100°F .

The main engine operates on a five-bladed propeller with a fixed pitch 5.2 M in diameter, made from Novoston bronze. The propeller shaft is connected with an intermediate shaft by a coupling, making it possible to remove the shaft through the deadwood. The deadwood layout of the propeller shaft is equipped with stuffing box backing type 630 MK 11 of the Vaukesha-Lips firm.

The vessel's power plant consists of four a.c. generators type SD8S1000-50, each with 950 kw-A power (400 v, 50 hz) driven by four-stroke trunk-piston non-reversing turbo-charged engines type 6AL25/30, manufactured in Poland under license from the Sulzer firm. The rated power for each engine is 809 kw (1100 hp) with a rotational frequency of 750 rpm. The vessel's requirements for electrical power when underway are ensured by two diesel generators. When the four GKhu refrigeration units are operating while the cargo is being cooled, three diesel generators are in operation (not over 48 hours). As an emergency source of electrical power, the vessel has an emergency diesel generator type ADGF 100/1500-R with a power of 125 kw-A (440 v, 50 hz), driven by a four-stroke trunk-piston non-reversing engine type 9D6BG. The emergency diesel generator is started up automatically from storage batteries when the main distributing board cuts off. The emergency diesel-generator may also be started-up manually.

The auxiliary engines operate on diesel fuel. Three self-cleaning separators type MARKh-309V, including one reserve, are installed in the fuel preparation system of the main and auxiliary engines. The cylinder cooling system for the auxiliary engines, with fresh water, is independent from the cooling system for the main engine.

The DAU system type VZS-K 1d (PNR production) ensures remote control of the main engine from the TsPU, from the control post in the wheel house and the bridge wings. The diesel generators are put into operation by remote control from the TsPU. In case of voltage loss in the busbars of the main switch-board, any other diesel generator takes over automatically as a back-up and, in less than 30 seconds, is automatically connected to the busbars.

The compressed air system for the power unit includes two automated electro-compressors type E2 -160A with a feed of 240 M³/hour each, at a pressure of 3 MPa and an automatic electrocompressor type SC2-115 with a feed of 70 M³/hour at a pressure of 3 MPa. A compressed air tank with a capacity of 0.16 M³ filled by a manual compressor with a feed of 2 M³/hour at a pressure of 3 MPa is designed to start up the emergency diesel generator. The demand for compressed air for operational needs is provided by two electrocompressors type WAN-AW/M with a feed of 62 M³/hour at a pressure of 0.7 MPa.

A water-tube boiler type VXV32-15 with a 3.2 t/hour productivity of saturated steam at a pressure of 0.7 MPa and a waste-heat boiler type LA729-01 with a productivity of 2.8 t/hour at a pressure of 0.7 MPa, operating on the exhaust gases of the main engine, fully ensure the vessel's need for steam supply.

The water-tube boiler operates on heavy fuel. The boiler is started up on diesel fuel, and the transition from it to heavy fuel is done manually. The water-tube and waste-heat boilers are equipped with automated control devices for their work and emergency-warning signals with respect to malfunctions and changes in the established parameters.

Supplementing the fresh water reserves is a vacuum distilling unit type WY250-1 with a productivity of 25 t/day, in which the secondary heat of the fresh water cooling the main engine cylinders is used as a heat carrier. The unit is equipped with a device for automatically switching over the distilled water for return to the distillation unit when the permissible norm for salinity is exceeded, and with a system for feeding into the TsPU signals on the disruption in its operation.

In accordance with the requirements of the International Convention to Prevent Pollution From Ships (MARPOL-73/78) a separator type OV-10M (produced by the PNR) has been installed on the vessel, ensuring a purification degree of oil-containing waters up to 15 mg/l. The enclosed-type system for purifying sewage water includes a biological processing unit type LK-50. There is an incinerator type SO-1, capable of burning 30 kg/hour of liquid wastes and 50 kg/hour of solid wastes to burn the debris and wastes from the separation of fuel and oil.

The vessel's fire defense is ensured by water, foam, vapor and carbon dioxide extinguishers. The water extinguishing system has two electric centrifugal pumps each with a feed of 100 M³/hour with a pressure of 80 M water column, and an emergency centrifugal pump with a feed of 45 M³/hour at a pressure of 75 M water column. The cargo holds, engine room, main engine receiver, smoke stacks from the boilers and incinerator and the emergency diesel generator room are equipped with a carbon dioxide extinguishing system. The carbon dioxide fire extinguishing system in the engine room has remote control from the post at the exit from the engine room and manual control from the carbon dioxide station on the upper deck. The foam extinguishing system of medium ratio, which includes a foam-forming tank, a dispensing unit and portable foam generators, serves as a supplementary means of fire extinguishing in the engine room.

The work of the power unit, the auxiliary mechanisms, the vessel's system and the main and auxiliary refrigerating units are monitored and controlled from the TsPU, placed in the engine room on the third deck in sound-proof facilities equipped with an automatic air conditioning system.

The automation devices for monitoring and control of the work of the power unit, auxiliary mechanisms and vessel's systems ensure the possibility of attending the mechanisms in the engine room when the vessel is underway by a single mechanic on watch at the TsPU.

Three electrohydraulic permanent rotary cranes (PNR production) have been installed as a cargo unit for the first time on Soviet reefers on the "Kursk": in the bow and stern sections, single cranes with a cargo lifting capacity of

5 t. each; between the cargo hatches of holds nos 2 and 3 is a twin crane with a total cargo lifting capacity of 25 tons. The maximum reach of each crane arm is 18 M.

The vessel is equipped with three Hall's bower anchors of 4 tons each, including a spare. The anchor assembly includes two windlasses, joined with automated mooring winches. The anchors are dropped by remote control from the wheel house. Indicators of the length of the slipped anchor chain are placed in the anchor unit control station area in the forecastle and in the wheel house, where the anchor drop rate indicators are located.

Four automatic and mooring winches with a pulling strength of 80 kH (8 ton-force) are installed on the vessel, two of which are coupled with windlasses. The vessel's mooring assembly meets the requirements of the rules of the Suez, Kiel and Panama canals.

The life-saving devices consist of two plastic motorized covered lifeboats, with a capacity of 50 persons each, three inflatable rafts for 10 persons each and an operative plastic lifeboat with an outboard motor.

The superstructure is equipped with living facilities for the 37 crew members, two passengers, four trainees and a pilot. Block cabins are provided for the senior staff officers. The crew members are accommodated in single-berth cabins. The vessel has recreation lounges, a library, facilities for hobbies, a gymnasium, a sauna and a swimming pool.

The vessel is equipped with modern devices for radio communication and electro-radio navigation, ensuring safe shiphandling and a reliable contact with the shore.

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MARITIME AND RIVER FLEETS

POLISH-BUILT BULK CARRIER 'KAPITAN SOROKA' PROFILED

Moscow MORSKOY FLOT in Russian No 11, Nov 84 pp 42-44

[Article by V. Kravetskiy and A. Kolosvetov, engineers of the Black Sea Shipping Company: "The Bulk-Carrier 'Kapitan Soroka'"]

[Text] The fleet of the Black Sea Shipping Company has been replenished with two ships of the same type "Kapitan Soroka" and "Kapitan Fomenko." The ships were built in Poland to class Lloyds+AL+LMC, UMS "Ice class 3."

Basic Description

Greatest length.....	186.3 m
Width	28.5 m
Draft	11.1 m
Tonnage:	
gross	20,698.7 register t
net	13,550.4 register t
Deadweight	35,084 t
Displacement	45,116 t
Volume of holds taking the volume of covers into account	41,560.7 m ³
Capacity of main engine	8.83 megawatts (12,000 horsepower)
Speed under load	15.3 knots

The bulk carrier "Kapitan Soroka" has interbottom and side tanks, a bow bulb and a pipelines tunnel. The ship has seven holds (holds Nos 2, 4 and 6 have supports for hauling heavy cargo) with hatch covers of the MacGregor system. The ship is designed for hauling grain and ore, has fastenings for hauling timber in packets and can take on 752 containers in holds and on the deck.

The cargo device consists of four electrohydraulic cranes of the (Haglunds) firm of Sweden with a capacity of 274 kW each, lifting capacity of 25 t each and the boom's sweep of 22 m. The design of the cranes provides for the possibility of working with grabs.

The steering gear consists of an electrohydraulic steering engine of the US500 TY-1 type. Control of the main drive is carried out from the bridge and from the panel in the tiller compartment. There is also manual control by pumps from the tiller compartment.

Anchor gear consists of two automatic electrohydraulic capstans with one warping drum each. The chain is of 67 mm gauge.

Two automatic electrohydraulic winches for mooring of the Cl2,5H type with one warping drum each are installed on the stern.

The ship's fire protection is carried out with the aid of various systems. The water firefighting system consists of two basic fire pumps of the 100 WA type with a feed of 100 m³ per hour each with a pressure of 90 m of water column. The pumps are started from the TsPU [central control post], from the navigating bridge and from the ballast and drainage systems control post. An emergency fire pump with a hydraulic drive and a feed of 50 m³ per hour with a pressure of 90 m of water column is installed in the systems passageway under the forecandle.

The carbon dioxide fire extinguishing system consists of 135 cylinders in a station located in the superstructure. Three carbon dioxide cylinders are in the engine room, for extinguishing fires in the sub-piston recess of the main engine. Two carbon dioxide cylinders for the paint locker are under the forecandle. Carbon dioxide from 113 cylinders can be let in manually into any hold from the carbon dioxide fire extinguishing station. The whole station is discharged into the engine room with the aid of a starting air bottle.

The steam fire-extinguishing system is intended for fuel tanks. A Norwegian-made fire signaling station is installed in the chart room with its secondary panel located in the deck signaling room. The station for hydraulic shutting of quick-closing valves in the machinery and boiler section and the panel for stopping fuel transfer pumps and ventilation are located on the main deck.

A water distilling plant of the WY250 type, which was made in the PNR [Polish People's Republic], has been installed for preparing fresh water from sea water. The fresh water obtained from the water distilling plant is used for washing, sanitation, as boiler feed water and for the main and auxiliary engines cooling system. After processing with the aid of mineralization and sterilization equipment, it is also used as drinking water. The water distilling plant's productivity is rated at 25 tons per day.

The ship has a sanitation unit for biological processing of sewage and fecal waste. The unit has been designed to work in various weather conditions.

A block oil separator of the OB-10 ZM type, which was produced in the Polish People's Republic, is installed for the cleaning of bilge water. The OB type separator is designed to isolate oil derivatives mixed with water and having a density that is lower than that of water as well as for pumping the separated water overboard. The separator meets IMO [not further identified] requirements.

After separation of bilge water and other oil residue reaches an oil-to-water ratio of 3.5:1, the oil waste is incinerated. Likewise, solid trash after it has been compacted.

The main engine is of the 6RND76 (Zul'tser-Tsegel'ski) type, which was made in the Polish People's Republic, and is a single-acting, two-stroke reversible engine of marine design with turbo supercharging and transverse scavenging. Rated power is 8.83 megawatts (12,000 horsepower) with the rotation frequency of the propeller shaft of 122 RPM.

The UTR 631-1 type turbo supercharger has a maximum rotation frequency of 10,000 RPM. The auxiliary electric supercharger has a rotation frequency of 3,550 RPM and an electric motor of 41 kW capacity. Installed in the cylinder lubricating system are storage batteries wound on the external ends of connections of the upper sleeve lubrication points (eight points per sleeve). Lubrication of the two lower points of every cylinder is carried out by a separate lubricator without using storage batteries. The fuel system makes it possible to start the engine on heavy fuel after a long layover without a preliminary start on diesel fuel. The main engine has a protective system, which stops it during the following values of control parameters: the pressure of water cooling cylinders is 260 kPa [kilopascal] (2.6 kilogram force/cm²), pistons--290 kilopascal (2.9 kilogram force/cm²) and lubricating oil pressures is 125 kilopascal (1.25 kilogram force/cm²).

Three auxiliary diesel-generators are installed to supply the ship with electric energy. In-line, nonreversible, water cooled, turbocharged and with direct fuel injection diesels of the 6AL25/30 type are used to drive the generators. Fuel with maximum viscosity of 27 (sSt) at 50°C is recommended for operation. Total capacity of the electric power plant is 2.1 megawatts and overall capacity of all consumers of electric energy is 3.8 megawatts.

A YL720/14-51 type combined water-tube boiler is installed for production of steam. The boiler is automated, does not require a mechanic to stand watch and has two heating surfaces, of which one is on oil heating and the other one is heated by gases exhausting from the main engine. The working pressure of steam is 700 kilopascal (7 kilogram force/cm²), steam output during operation of oil burner is 2,000 kg per hour and during operation of waste-heat boiler 1,800 kg per hour.

A right-hand rotating screw propeller with four blades of 6,000 mm diameter and a mass of 19.2 t is installed as a propulsive device. There is also a spare screw.

Two Laval MAPX 309B-24-60 separators with a productivity of 4,550 liters per hour for cleaning heavy fuel, a MAPX 309B-24-60 separator with a productivity of 9,800 liters per hour for cleaning diesel fuel and two Laval MAPX 207S-24-60 separators with a productivity of 4,750 liters per hour for cleaning oil are installed. In addition there is a Laval MAB 104B-24-60 oil separator for auxiliary diesel-generators with a productivity of 1,550 liters per hour. The separators are equipped with automatic operation control systems.

The power unit, produced by the CSI [not further identified] firm (Holland) and the USMK [not further identified] firm (Polish People's Republic), has a fault warning signaling system which serves 202 points. It basically operates on analog input signals: temperature and pressure control of basic parameters

of the main engine operation, pressures and temperatures of auxiliary diesel-generators, pressures in auxiliary systems, emergency condition of individual mechanisms, control of resistance to isolation and breakdown of the main distribution board and high and low levels in tanks and wells of the engine room and holds. The system delivers a signal to the video monitor with simultaneous recording on a teletype tape and giving out sound and light signals to the engine room, the wheelhouse, the cabin of the mechanic of the watch, the ballast operations control panel and the messroom. Acknowledgement of receipt by all blocks of generalized signaling can be realized even with duty watch-free servicing only from the central control post. The signal is removed from the video monitor only after the malfunction is eliminated and the parameters are brought within the bounds of tolerance or by entering the signal which has departed from the norm in memory. In the latter case an entry appears on the video monitor that the emergency signal is in memory. Any of the 202 controlled parameters can be signaled to the video monitor. During a failure of the video monitor, all analog parameters can be signaled directly to the computer, where the true significance of values and levels are specified.

The station for control of the main engine's exhaust gas temperatures, which works together with the computer, can also signal temperatures for individual cylinders. The sensors of the exhaust gas control station and the CSI are combined. All parameters controlled by the fault warning signaling system are divided into groups. The group A: exceeding the rotation frequency of the crankshaft, actuating protection of the main engine (for water and oil), emergency "stop," and unsuccessful start-up of the main engine. The group A parameters lead to the stopping of the main engine, and others only give warning signals and are divided into groups depending on importance. The shortcoming of the system is absence of parameters which lead to a reduction in the rotation frequency of the main engine, although there is such a possibility in the overall scheme.

The main engine is controlled with the aid of the DAU [not further identified] pneumo-electronic system of the ZSPN^OZU (Kh. Tsegel'ski) type which was produced in the Polish People's Republic. The system of control and the measuring of temperatures and pressures is set up through a CSI computer. The electronic tachometer control system is of the TK-114 type of the (Noris) firm (Norway) and tachometer sensors are of the (Hasler) firm (FRG).

The automatic remote control of the main engine carries out the start-up, the shut-down and load control of the main engine from the central control post and the wheelhouse; puts the main engine in the mode and withdraws it from the mode according to a load program during control from the wheelhouse; emergency speed and "stop" of the main engine directly by push buttons on control panels in the central control post and in the wheelhouse; and protects the main engine as regards water pressure, cooling of cylinders and pistons, oil pressure and exceeding the permissible rotation frequency of the main engine. Emergency speed overrides all main engine safeguards except the protection as regards exceeding the rotation frequency. Putting the main engine in the full speed mode is carried out according to a load program beginning from the shaft rotation frequency of 88 RPM. Provisions are made for extraordinary putting in and withdrawing from the full speed mode.

The auxiliary diesel-generators are also equipped with an automatic remote control system of the USAP type made by the (Yupitra Zimpiya) firm, the Polish People's Republic. The system carries out the start-up and shut-down of diesel-generators; automatic start-up of the spare diesel-generator during a drop in the frequency and pressure on GRShch bus bars; protection of the diesel-generator with respect to temperature and water and oil pressure and exceeding the rotation frequency of the crankshaft; and automatic oil circulation of spare diesel-generators and automatic synchronization and excitation of diesel-generators.

The radio navigational equipment plots the fairway, charts (memorizes four area charts); defines the ship's relative and true movement and targets; follows 50 of them in a 24-mile scan zone; fixes the course and north; defines the point and time of closest approach and dangerous targets in the assigned zone; reports on the drift of targets and the loss of an old target. It has four training programs.

The satellite system operates according to five navigation satellites and carries out the ship's dead reckoning; shows the current latitude and longitude, the distance traveled and the direction and speed of drift; signals the deviation from the course for assigned value; shows the satellite number and time of its appearance and height (in angular units) over the horizon; and can plan the forthcoming passage with intermediate points (course, time and distance between points). The device's memory retains 10 parameters, certain parameters are entered in it ("man overboard," SOS and so forth). During an overflow of the memory, the old and least important parameters are erased. The system ensures automatic plotting of the course in the Mercator's projection: any sector of a chart with a course can be signaled on the visual display. Upon installation of a flowmeter, the system can also calculate fuel expenditure.

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MARITIME AND RIVER FLEETS

CHARACTERISTICS OF 'GENICHESK'-CLASS BUCKET DREDGERS

Moscow MORSKOY FLOT in Russian No 11, Nov 84 pp 50-51

[Article by S. Chertykovtsev, senior engineer of the All-Union Mortehtsudoremprom Association: "The Multibucket Dredger"]

[Text] In the 11th Five-Year Plan, the fleet of sea-lanes administrations of the Minmorflot [Ministry of the Maritime Fleet] is being supplied multibucket dredgers with a productivity of 750 m³ per hour. They are being built at the Neptune shipyard (Rostock City, GDR). The Ministry of the Maritime Fleet has already received three dredgers of this class: the "Genichesk," "Inzhener Balarza Mamedov" and "Ivan Bakhvalov."

The "Genichesk" dredger is a twin-screw single-deck diesel-electric vessel with a forecandle and a stern slot. Crew quarters are located in its bow section, the engine room in the midsection and the working gear in the stern. The vessel is designed for dredging work on hard soil in basins unprotected from sea disturbances during the maximum height of waves of 0.5 m as well as in intraport water areas and into a dry shore. The dredger can perform dredging work in temperatures down to -10°C at depths from 5 to 18 m. The optimum scooping depth is 11-14 m. The scooping depth is increased to 24 m when the scooping frame is extended by means of a spacer.

Basic Characteristics

Greatest length (without the scooping frame).....	79.8 m
Width (with the guard rail).....	14.7 m
Maximum draft.....	3.69 m
Productivity at a depth of 12 m (soil category V).....	750 m ³ per hour
Speed.....	8.8 knots

The vessel was built according to rules of the USSR Registry of Shipping to class KM(*)L2 1A2 (dredger).

A bucket chain with intermediate links is used on the dredger. The 800-liter capacity buckets are made of high-strength steel by the casting method. The cutting edges of buckets are strengthened with wear-resistant facing. The number of buckets in the chain changes from 46 to 63, depending on the depth of scooping. The bucket chain is hung on a box-shaped scooping frame on which 30

guide rollers are installed that serve for support and direction of the bucket chain. Six of these rollers are located on the underframe, which is designed for bridging the distance between the upper bucket drum and the scooping frame during a scooping depth of more than 14 m. The bucket chain is driven through the upper hexahedral bucket drum from a 420 kW direct current electric motor. The bucket drum, which is installed on the lower end of the scooping frame, is a heptahedral one.

The movement speed of the bucket chain has a slide control from two to 30 buckets per minute. The scooping frame leans on the wall incline of the middle tower with its upper end, the lower end is hung on the frame-raising cable which is served by two frame-raising winches with a rated tractive force of 400 kilonewtons each.

The frame-raising winches ensure the lifting of the scooping frame from a working position to a "stowed" position under the dredger master house.

During operation, the soil from buckets is fed to a soil well, which is located in the middle tower, from where it is conveyed by chutes to scows positioned at the side.

The fore-and-aft movement of the vessel is carried out with the aid of a forward winch with a maximum tractive force of 590 kilonewtons. For the purpose of side movement the vessel has 2 front winches with a maximum tractive force of 245 kilonewtons each and 2 rear winches with a tractive force of 186 kilonewtons each. For the purpose of restraining the vessel during dredging operations there is also a rear mooring winch with a maximum tractive force of 186 kilonewtons. Two winches with a rated force of 30 kilonewtons are installed on the vessel for the purpose of drawing to and restraining the soil-hauling scows at the side.

The soil collecting operations are controlled from the dredger master post, which is located on the front tower that is installed in the vessel's stern section over the slot. The dredger master post has an all-round field of view.

The anchor gear consists of two standard anchors and one spare anchor of the Gruzon type with a mass of 1,750 kg each, two 43 mm and 225 m long anchor chains and two anchor capstans with a tractive force of 65 kilonewtons each.

The vessel has two rudders, each of which is driven by a self-contained hydraulic steering engine.

Semicovered motorboats, which are made of fiberglass and can hold 36 people each, are installed one each on the right and left sides of the bridge deck. There are also two rescue rafts, which can hold 20 people each. There is a working boat with an outboard motor.

An electrical crane with a lifting capacity of 8 t is installed in the stern on the right side of the vessel and a cargo boom with a lifting capacity of 5.5 t is installed in the vessel's bow section for taking on and transferring equipment and provisions as well as for performing repairs.

The main power unit is a diesel-electrical one. The first main diesel engine is a 8NVD48A-2 8-cylinder, nonreversible, four-cycle, trunk-piston single-acting and turbocharged diesel engine of 970.8 kW (1,320 horsepower) capacity. The second one is a 6NVD28A-2 6-cylinder diesel engine of 735.5 Kw (1,000 horsepower) capacity. This was done for optimum utilization of the diesel engines when processing soils of various gravity. Each of the diesel engines works for a direct current generator of 670 kW capacity and a three-phase current generator of 550 kW capacity. Two direct current generators supply main propulsion motors of 570 kW capacity during crossing or electric motors of 420 kW capacity to operate the upper bucket drum during soil collecting operations. The alternating current generators ensure the vessel's needs during movement and soil collecting operations. The vessel also has a self-contained diesel-generator of the 6NVD26A-2 brand of 250 kW capacity and an emergency diesel-generator of 46 kW capacity.

Control of the vessel's power unit and auxiliary mechanisms is carried out from the TsPU [central control post]. The centralized control system and other control devices and elements are also located there.

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MARITIME AND RIVER FLEETS

BRIEFS

FLOATING CRANE FROM FINLAND--"Titan-2" is the name of one of the world's largest catamaran-type floating cranes being built on order from the USSR by the Finnish corporation Wärtsilä. It is designed for use in constructing oil drilling rigs at sea. As a representative of the Wärtsilä Shipbuilding Yard noted, design and construction of vessels of this type indicate the development of an entirely new field of shipbuilding. He considered Soviet orders to be an important factor in the expansion of the Finnish shipbuilding industry, contributing greatly to the high rate of employment in that sector. [Text] [Moscow VODNYY TRANSPORT in Russian 12 Jan 85 p 1] 12809

RIVER FLEET DREDGING EQUIPMENT--Novosibirsk--The RSFSR Ministry of the River Fleet has begun series production of hydraulic dredges, high-capacity barges, survey boats and other special equipment for an industrial-grade dredging system. Rivermen generally prefer seven feet below keel. For Siberian navigators, this desire has practical, not formal, significance. Most of the time, the blue high-ways here are shallow and impassable for ships. And rivers are virtually the only way to supply goods to oil fields, lumber operations and new construction sites. Workers of the Novosibirsk Institute for Water Transport Engineers have designed a set of equipment for a bottom-dredging system which should cut a path for ship convoys. Its individual components were successfully tested in the last navigational season. The entire system is scheduled for testing this summer. Specialists estimate that its use will save a half million rubles. [By SOTSIALISTICHESKAYA INDUSTRIYA correspondent A. Lyakhov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 19 Jan 85 p 2] 12809

TUGS FOR SIBERIAN RIVERS--Perm, 19 Jan--Soon 1,400-hp tugs will appear on Siberian rivers. The collective of the local Kama Shipyard is assembling the first ship of this class. This new river worker can haul barges carrying up to 9,000 tons of cargo at 12 km/hr. Its two diesel engines are produced in Czechoslovakia. Testing of the new vessel will begin this year. Perm shipbuilders are slated to produce 3,000-hp tugs in the near future. [By PRAVDA correspondent S. Ryabov] [Text] [Moscow PRAVDA in Russian 20 Jan 85 p 3] 12809

TANKER FOR LATVIAN SHIPPERS--(TASS)--The tanker Aleksandr Kaverznev has arrived in Ventspils, its home port. The ship is named for the talented Soviet journalist and winner of the USSR State Prize. Aleksandr Kaverznev devoted himself to Soviet radio and television for nearly 25 years. Millions of people remember his passionate reporting from Sofia, Warsaw, Budapest, Havana, Vietnam, Cambodia and Afghanistan. It is symbolic that the tanker has been transferred to the Latvian

Shipping Company, since A. Kaverznev began his journalistic career in its large-edition newspaper. "The Aleksandr Kaverznev is the first ship added to our fleet this year," said the company's chief, V. Dyrchenko. "It can handle more than 8,000 tons of liquid chemical cargo. The tanker has been registered in Ventspils, where the port's chemical handling and processing plant is increasing its output every year." [Text] [Moscow VODNYI TRANSPORT in Russian 24 Jan 85 p 2] 12809

NEW DRY CARGO SHIP--Yuzhno-Sakhalinsk, 23 Jan. (TASS)--A new dry cargo ship, the Akademik Pozdyunin, has completed its maiden voyage and joined the Sakhalin Shipping Company fleet. The ship successfully sailed through southern seas to the coast of Sakhalin and to its home port of Kholmsk. This ship, with an extra-high ice rating, can sail to ports in the Eastern Arctic. Highly experienced in operating in severe Far Eastern sea conditions, the sailors at Sakhalin are increasing arctic shipping volume each year. [Text] [Moscow PRAVDA in Russian 24 Jan 85 p 2] 12809

LIGHTER-CARRIER INDIRA GANDHI--(TASS)--A new Soviet ship will bear the name of the prominent Indian stateswoman and political leader and great friend of our country. The Indira Gandhi is being built in Kherson and will go into operation this year. This will be the second ship in a series of newly designed lighter-carriers which are being added to the fleet. The first of the class, the Aleksey Kosygin, was built a year ago and has exhibited outstanding seagoing and service qualities while operating for the Far Eastern Shipping Company. The Indira Gandhi will become the first lighter-carrier in the Black Sea Shipping Company. The ship, named in honor of the passionate fighter for peace and security among peoples, will carry peaceful cargo between the Ukraine and Southeast Asia. [Text] [Moscow VODNYI TRANSPORT in Russian 26 Jan 85 p 3] 12809

NEW RO-RO FOR CASPIAN--One more vessel with horizontal loading has been built for the Caspian Maritime Shipping Company by shipbuilders of the GDR. It was given the name of outstanding Russian composer Mikhail Glinka. As told by vessel captain Mikhail Filimonov to a correspondent of AZERINFORM [AZERBAIJAN TELEGRAPH AGENCY], the "Kompozitor Glinka" has shown excellent navigational qualities during tests. Built in accordance with the latest achievements in shipbuilding, the vessel is equipped with automatic systems for keeping it on course. All conditions for productive labor and rest of the crew have been created on the motorship. The "Kompozitor Glinka" takes aboard more than 350 motor vehicles or nearly 200 various trailers with cargo. [By an AZERINFORM correspondent] [Text] [Baku BAKINSKIY RABOCHIY in Russian 25 Jan 85 p 2] 9817

CONTAINER SHIP 'MEKHANIK ZHELTOVSKIY'--Arkhangelsk--The new container ship "Mekhanik Zheltovskiy" has joined the transport fleet of the Northern Maritime Shipping Company. It will transport containers on the Arkhangelsk--Dudinka--Arkhangelsk route. [By G. Alekseyev] [Text] [Moscow VODNYI TRANSPORT in Russian 7 Feb 85 p 1] 9817

CEMA SHIP CHARTERING SYMPOSIUM--A symposium on the utilization of computer technology in the work of chartering and shipowner organizations of CEMA-member countries was held in Moscow at the CEMA Secretariat building with the assistance of the Vessel Chartering Coordination Bureau. Participating in the work of the symposium were representatives of chartering, shipowner and forwarding organizations of the NRB [People's Republic of Bulgaria], the VNR [Hungarian People's Republic], the GDR, the Republic of Cuba, the PNR [Polish People's Republic], the USSR and the CSSR. During sessions, reports and information were heard on utilization of electronic computer technology in the work of chartering and ship owner organizations, which were prepared and presented by the (Mafrakht) and (Mashped) (Hungarian People's Republic), the (DZR) and (Doytfrakht) (GDR), the (PLO), (PZhM) and (Ts. Khartvig) (Polish People's Republic), the V/O Sovfrakht [All-Union Association for Chartering Foreign Tonnage] and the V/O Morkonteyner of the USSR MMF [Ministry of the Maritime Fleet] and the (Chekhofrakht) (CSSR). Participants in the symposium exchanged views on the content of reports and information as well as on questions of reliability of equipment of various manufacturing firms which is being used. Representatives of organizations which participated in this meeting noted its usefulness and made arrangements to hold the next symposium in the early part of 1987. [Text] [Moscow VODNYI TRANSPORT in Russian 7 Feb 85 p 3] 9817

FREIGHTER 'NIKOLAY YANSON' LAUNCHED--Leningrad (TASS)--The freighter "Nikolay Yanson" was launched by shipbuilders of the A. A. Zhdanov Shipyard. [Text] [Moscow VODNYI TRANSPORT in Russian 16 Feb 85 p 4] 9817

'OMSKIY'-CLASS SHIPS DELIVERED--Four more river-sea class vessels were added to the fleet of the Amur River Shipping Company. The "Omskiy"-class ships, which were built at Romanian shipyards, will be assigned to the route linking the Blagoveshchensk river port with the Moskalvo anchorage point on Sakhalin. [By a VODNYI TRANSPORT correspondent] [Text] [Moscow VODNYI TRANSPORT in Russian 19 Feb 85 p 1] 9817

TANKER 'KAPITAN MAKATSARIYA' DELIVERED--The fleet of the Georgian Shipping Company was replenished with this year's first new vessel with a deadweight of 16,354 t, which was built in Yugoslavia. The tanker "Kapitan Makatsariya" is named after a well-known navigator on the Black Sea. [By R. Gologorskiy] [Text] [Moscow VODNYI TRANSPORT in Russian 19 Feb 85 p 1] 9817

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FISHING FLEET DEVELOPMENT

DEPUTY MINISTER ON PROPOSED SOVIET FLEET DEVELOPMENT

Moscow RYBNOYE KHOZYAYSTVO in Russian No 12, Dec 84 pp 3-5

[Article by USSR Deputy Minister of the Fish Industry Yu. N. Bystrov:
"The Prospects for the Development of the Soviet Fishing Fleet"]

[Text] Prior to the opening of the 6th scientific and technical conference on the development of the fishing fleet and the fishing industries of the socialist countries its participants had already acquainted themselves with the results of the summit-level Economic conference of CEMA countries held in June 1984 and its Declaration on the further broadening and intensification of economic, scientific and technical cooperation between them, as well as the Declaration by the CEMA countries "The Preservation of Peace and International Collaboration".

Speaking at a reception in honor of the participants of that meeting on June 14, 1984, comrade K. U. Chernenko said: "It is gratifying to note that the meeting took place in an atmosphere of friendship and a sincere desire to understand more deeply each other's interests and needs, to make our collaboration even more intimate and effective. We all draw strength from the inexhaustible spring of Marxism-Leninism, from our loyalty to internationalism. We are united by a common concern for a common cause, by our responsibility for the fate of socialism..." These words lent the proceedings of the 6th conference special political overtones and a positive business atmosphere. Attending it were over 300 delegates from the PRB, GDR, PPR, Cuba, the SRR and the USSR and observers from the DPRK.

The five preceding conferences (the first was held in 1956) helped identify the optimal directions and determine the rational sequence of the phases in the development of the fish industry in the socialist states and played an important role in accelerating the technical progress of the fishing industry and its mainstay - the fishing fleet.

This allowed the countries participating in the conference to continue effective fishing on the high seas.

The Soviet Union's technical policies in the fishing fleet and fishing industry spheres was in strict compliance with the recommendations laid down by the preceding (5th) conference.

These recommendations served as the basis for improvements in the fishing fleet as dictated by the changed conditions of world fishing and for determining the basic types of fishing, receiving and transport as well as auxiliary vessels called for; several new, progressive methods of fishery and processing were mastered, some production processes mechanized or automated, output variety was broadened and its quality noticeably improved.

Cooperation among the socialist countries in the areas of industrial fishing and fishing vessel construction during the period after the 5th conference steadily expanded and deepened. A number of research products, the creation of new fishing craft, devices and mechanisms were carried out in close collaboration.

The 6th scientific and technical conference on fleet and fishery development in the socialist countries took place at a time when the spread of new methods of fishing the World Ocean prompted by the establishment by most maritime states of 200-mile fishing and economic zones was in its final stages and the intensification by all countries of the fishing process had begun.

In spite of the significant growth of fish catches in internal reservoirs and the development of fish breeding everywhere, the World Ocean remains the principal source of edible fish and fish products for mankind.

Solving the problem of adequately supplying the population of the CEMA countries with fish, diversified fish products and seafood entails the further expansion of fishing activities on the high seas with more of the overall catch being used for food and more attention devoted to the rational use of the World Ocean's resources.

Obviously, the principal role in the implementation of these tasks will be played, as it has in the past, by the fishing fleet.

In the period following the 5th conference new and quite modern fishing craft were built, are under construction or in the design stage in the USSR, GDR and PPR.

One such is the fish-and-krill trawler of the "Antarktida" class which has facilities for canning krill, freezing dressed fish and manufacturing fodder meal and technical fat. The first ship of the series will be commissioned shortly.

In 1985 the fleet will get its first special calamar fishing craft.

During the 11th Five-Year Plan period, series production began of "Moryana" type vessels specially designed for extracting Caspian

sprat from the sea by means of searchlight and pumps and for the manufacture of preserves.

Being built in the GDR is a fishing, refrigerator and cannery supertrawler project-named "Atlantik-488". Vessels of this class will be able to trawl at very significant depths and net targets moving at high speeds.

The shrimp-fishing fleet has been joined by the first such Polish-built vessel. These ships will concentrate mainly on shrimp, but will also catch fish.

The receiving and processing of catches and the servicing of medium and small craft will continue to be done by processing vessels.

In the first years of the 11th Five-Year Plan these latter consisted of the Soviet-built "Pyatidesyatiletie SSSR" and the Polish-built "Konstitutsiya SSSR" types of all-purpose mother ships. There will be further improvements and continuing construction of mother ships under a project now in the final stages of development.

The processing fleet will receive new crab and fish-canning ships and small mother ships for the Far East and for offshore fishing in other Soviet basins.

With the development of ocean fishing and the growing distances between the fishing areas and base ports an increasingly important role is to be played by receiving and transport vessels. Fleet replenishment with such vessels will also involve new designs.

The next few years will see the creation of new research ships, new types of vessels for inland reservoirs and auxiliary ships for maritime ports.

Construction will continue of the operationally-proven large freezer fishing trawlers of the "Pulkovskiy Meridian" class, medium freezer fishing trawlers and refrigerator seiner-trawlers of the "Nolinsk", "Al'pinist" and "Nadezhnyy" types as well as the construction in the GDR of receiving and transport refrigerator ships of the "Almaznyy Bereg" class and others.

Special attention must be devoted to the creation of ships that would store and transport catches live in their holds. These are indispensable if we are to increase yields in purse-seine fishing. The solution of the problem lies in the hands of scientific and research organizations which must come up with precise specifications and technological parameters to serve as guidelines for the project designers and builders of these vessels.

At the same time a solution must be found to several top-priority questions concerning the improvement of the Soviet fishing fleet's technical level.

In order to save costly diesel fuel the new vessels must revert to high and medium-viscosity fuels, efforts to raise engine fuel-efficiency to the level of the topmost world achievements must be pursued with greater vigor.

To save energy resources the new-type ships must be equipped with facilities to utilize the heat of gases escaping from the main and auxiliary engines, recycle heat generated in water coolants by various machines, apparatuses and mechanisms, extract petroleum products from refuse liquids, sewage etc. and make possible strict observance of all regulations concerning protection of the environment.

Efforts will continue to improve working and living conditions for ships' crews. To achieve this we must do away with four-berth cabins and provide sports and physical culture facilities, including training apparatuses.

Further improvements in automation and technical diagnostics must be based on the use of microprocessor technology which will lead to greater operational reliability in the ships and will allow them to be run without the continuous presence of watch personnel in the central control room and engine rooms.

Raising the effectiveness of the fishing fleet's performance is to a large extent contingent on the creation of fishing gear with a more extensive range stemming from better hydromechanical characteristics and more advanced materials, on the development of less energy-intensive catching methods, the comprehensive mechanization and automation of the fishing process and the creation and incorporation into production of the relevant technology.

The current level of mechanization in the sphere of fish processing aboard special vessels is unsatisfactory. The proportion of manual labor in the sorting, dressing, packing, sealing and tying operations is still too high. Bolder use must be made of robots and manipulators to perform these tasks.

A great deal of project-design work must be carried out in the next few years to achieve full mechanization and automation in processing the catch, from the loading of the bunkers to the stowing of the finished product in the holds.

The level of mechanization in transport and transloading operations on the fishing craft remains low. The situation calls for the expansion on a new technical level of containerization and packeting in cargo haulage.

The changes that have occurred in the raw-materials base make it necessary to come up with new piscatory and non-piscatory resources reprocessable into food, to intensify technological operations through the use of new methods, physical or otherwise, of processing the catch and to create and incorporate into production machinery to process mollusks, seaweed and other non-piscatory resources.

Work will be continued on the development of a computerized onboard tracking and navigation complex that will automate steering and provide for aimed fishing by projecting the underwater situation on a color display screen, and of new hydroacoustic instruments to seek out concentrations of fish and control the parameters of the fishing gear, instruments capable of functioning within an automated system.

The closing plenary session of the 6th conference which took place on August 6, 1984 adopted a resolution aimed at uniting and coordinating CEMA members' efforts, calling for a common policy in the development of the technical tools of commercial fishing and, finally, creating new mechanisms and machines that would allow each participating country to take concrete steps to develop its fishing industry and fishing-vessel construction in line with collectively established guidelines for technical progress in the above fields over the next five-year period.

The resolution lays special emphasis on the further unification of efforts to protect the biological resources of the World Ocean, the preservation and reproduction of fishable resources, the development of mariculture and the prevention of sea pollution.

The assembled delegates particularly stressed the role and significance of these traditional conferences and their contribution to the well-being of the socialist commonwealth.

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PORTS AND TRANSSHIPMENT CENTERS

DEPUTY MINISTER ON SHORE FACILITY DEVELOPMENT

Moscow MORSKOY FLOT in Russian No 12, Dec 84 pp 2-3

[Article by L. Nedyak, deputy minister of the maritime fleet: "Development of the Sector's Shore Facility"]

[Excerpt] During the eighties, nearly R3 billion was directed toward development of the maritime transportation's coastal facility, which has made it possible to build transshipment complexes in ports with a total capacity of 60 million t and with harbor berths 16.7 km long. Nineteen modern specialized complexes for processing bulk, general and liquid cargo were put into operation.

The sector's degree of equipment was constantly growing. During the years of the 10th Five-Year Plan, dockers-machine operators have received more than 300 portal and nearly 50 crawler-mounted cranes, more than 3,500 automatic loaders and 800 electric loaders. More than 2,500 grab buckets of various lifting capacity, 730,000 pallets, a large quantity of load-handling devices and 50 other mechanisms were made.

During the 1981-84 period, shipping companies and enterprises of the Minmorflot [Ministry of the Maritime Fleet] received 330 portal cranes, 151 truck cranes, 31 pneumatic cranes, 178 bulldozers, 128 excavators, 3,900 diesel engines, 1,300 compressors and 2,570 units of metal-cutting machine tools and forging and woodworking equipment.

In the 11th Five-Year Plan, construction of new ports, shops, berths and warehouses and fitting out of enterprises with modern transshipment equipment is being continued, and great attention is devoted to the construction of the Novotallinn port and the USSR-GDR ferry crossing.

Important tasks of the fleet's shore facility in the long-term to the year 1990 are maximum acceleration of loading and unloading work, reduction of the lay-over time of vessels in ports, increase in the operational period of vessels, ensurance of their accident-free operation and satisfaction of social requirements of sector workers.

Solution of these tasks requires qualitatively new technical means and forms of control over production. Specialized and combined means and technological processes are replacing general-purpose technical means and technological processes, which for a long time have represented the basis of the technical policy for developments of the sector.

In the forthcoming period, the build up of traffic capacities of ports will be carried out mainly through construction and expansion of specialized complexes and by using new processive technology (container, ro-ro, package, hauling lighter and so forth).

Special complexes for the transshipment of heavy and large-size cargo will be built in all basins. Construction of maritime railway crossings, domestic as well as international, is being developed. Among maritime transportation's main tasks are further development of the Northern Sea Route and strengthening of the fleet's ship repair base.

A vital place in strengthening the shore facility for comprehensive servicing of the transport fleet is allotted to construction of new environmental pollution prevention projects.

Further development of maritime transportation's material and technical base is based upon fixed capital replacement with consideration of reequipment and modernization of existing enterprises at a qualitatively new level.

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PORTS AND TRANSSHIPMENT CENTERS

PERFORMANCE, CAPABILITIES IMPROVING AT KLAIPEDA PORT

Moscow MORSKOY FLOT in Russian No 12, Dec 84 pp 10-12

[Report on interview with S. Kvasha, chief of Klaipeda port and chairman of the transportation center's coordination council, by G. Yakovlev: "Everyday Life of the Transport Center"; date and place not specified]

[Excerpts] Klaipeda port--the maritime gates of the Lithuanian SSR--is linked by sea-lanes with 130 harbors abroad. More than 2,000 Soviet and foreign vessels moor at its berths annually. The cargo turnover of the port grows along with the growth of the Soviet Union's foreign trade relations. During the years of the 10th Five-Year Plan alone, more than 20 million t of cargo was processed here, basically export and import cargo.

A transportation center was established here on the basis of the port, which includes the Klaipeda railway station and the Siauliai Division of the Baltic Railroad, the Klaipeda office of the V/O Soyuzvneshttrans [not further identified] and the Lithuanian Shipping Company.

A coordination council, which is headed by its chairman and port chief S. Kvasha, was established to supervise operations of the transportation center. In an interview with our correspondent he described the joint activity of related enterprises, the effectiveness of labor cooperation and problems of the transportation center.

"Among the most important questions which are being solved at meetings of the coordination council are consideration and confirmation of measures on joint utilization of computer facilities and exchange of information, development of joint measures on preparations for work under winter conditions and finding reserves for increasing the volume of cargo shipments.

"The creative cooperation of related enterprises has yielded noticeable results: the quality of information on the approach of railcars with export cargo has improved--the MPS [Ministry of Railways] now provides daily information on the shipment of mass cargo on all railroads. Order and uniformity have been straightened out in accounting and accountability of railcar processing.

"There are no more cases where the port records time saved on car processing while the station reports time lost. The time saved is now the same in the port as well as at the station. Daily examination of work results ensures more efficient discovery and elimination of shortcomings.

"Additional intraport railway tracks were laid and telephone and telegraph communication between the port, the station, the division and the railroad administration was expanded. Measures have been adopted on raising cargo safety during transshipment and hauling, ensuring railcar park safety and increasing the port's loose cargo processing capacities. (Tackle handlers) of the port and the Transflot [not further identified] and acceptance and transfer personnel of the station are being utilized more efficiently. The coordination council has adopted and introduced some normative documents. Thus, instructions have been prepared for developing a shift-day plan of work.

"It is important to emphasize that the transportation center also coordinates its work with some organizations which are not a part of the center but are closely linked with it. They are mainly various inspectorates: sanitation, fire, quarantine, grain, veterinary, technical, export commodities quality and others--approximately 20 in all. A representative of any of them can impose penalties, which must be fulfilled even if they are erroneous. For the purpose of eliminating such cases we invite leaders of these inspectorates when necessary to meetings of the coordination council. Requirements of the inspectorates are mutually coordinated, and measures are adopted in advance of their fulfillment. We were thus able to establish businesslike contacts and improve relations. The port has established normal work conditions for workers of inspectorates, and all of this contributes to successful activity of the transportation center.

"Collectives of related enterprises of the transportation center form a truly creative union," the port chief continued his description, "constantly improving technological processes of loading and unloading work and introducing progressive schemes of stacking cargo in railcars. As a result, processing of railcars and vessels is speeded up and work indicators of the whole transportation center are improved.

"On account of the variety of transport characteristics of the cargo moving through the port, port workers and railwaymen came across certain difficulties in selecting optimum schemes of their distribution and fastening, at times railcars were used inefficiently with respect to lifting and load-carrying capacity. For the purpose of maximum utilization of railcar possibilities and reducing periods of their processing, port workers and railwaymen have worked out a book of illustrations of the technical conditions in distributing and fastening cargo on rolling stock in Klaipeda port. As the cargo mix is expanded, the book of illustrations is supplemented with new loading schemes.

"A scheme has been worked out for consolidated loading of chemicals and other substances in metal barrels into covered railcars. This has made it possible to use the lifting and load-carrying capacity of railcars more efficiently. According to this technology, one railcar is released per 1,000 t of cargo.

"Not long ago a considerable quantity of imported chemicals did not arrive at the port in packages. As a result of constant cooperation with clients, the coordination council was able to achieve that sack cargo, which arrived before by the piece (by individual units), now arrives in a packaged form on pallets that are used once only.

"Loading of packages into covered railcars is conducted on specially built ramps near the tracks with the use of railcar loaders, which are equipped with various gripping devices.

"For a long time export asbestos arrived in individual sacks in covered railcars. They were unloaded manually from railcars, and processing periods were not maintained. Together with railwaymen and with the participation of clients hauling of asbestos in packages was introduced.

"A large quantity of steel arrived on flatcars in rolls in a vertical position ("on butt end"). Therefore, the rolls were stored by railcar (one railcar--one stack) and much storage space was lost because of this. Cargo in every railcar now consists of the same number of rolls, which has made it possible to place cargo from one railcar above cargo from another railcar in the storage area. As a result of the new storage method, considerably more cargo is stored in the same space, and the process of loading vessels was speeded up because of the reduced volume of cargo transfer within a storage area. Introduction of this technological scheme yields more than R10,000 in savings annually.

"The technology of loading and unloading packages on pallets that are used once only from vessels has been improved. This work was conducted with crane forked gripping devices with one package per 'lift.' Introduction of a coupled crane forked gripping device has made it possible to load two packages at the same time. This has made it possible to save up to R5,000 annually.

"During the first half of 1984, the saving of time in railcar processing amounted to 17.4 percent. Although these norms were increased as of 1 January 1984 by 10 percent, the static load per railcar has increased by 0.1 t. All of this has made it possible to conditionally release thousands of railcars. For 3 years 85 percent of all imported cargo has been transshipped using the direct method. Hauling of cargo in packages on liner vessels of the Lithuanian Shipping Company has increased by 82 percent in 1983 compared to 1980. The Soyuzvneshttrans has been giving assignments and orders more in advance.

"At the same time, the belated supply of railcars for direct version is almost the only reason of vessel layovers above the norm; there were 32 such vessels in the first half of 1984 alone. A demurrage in the amount of R231,000 was exacted for their layover. But only a R50,000 fine was demanded from the railroad for failing to supply railcars for unloading these vessels. Making the railroad responsible for failure to supply railcars for direct version against the plan and not against the coordinated order, as provided by railroad regulations, would contribute to reducing the layovers of vessels. Moreover, the amount of the fine should completely cover the demurrage. It is also necessary to completely eliminate the above-norm layovers of railcars and to exclude cases of providing railcars that are out of order to loading fronts.

Prompt and reliable information on the supply of rolling stock to the port must also be ensured. Strange as it seems, but the most unreliable information is received on refrigerated sections, although this is the only type of rolling stock which proceeds with a 'crew' and a section chief. Quite often neither the technical nor commercial condition of a section is known prior to its arrival at the station or at a loading front.

"The transportation centers, which operate on the basis of maritime ports in the Baltic area, are united in a regional transportation center. We believe that possibilities of this regional transportation center are very great, but so far it has been operating sluggishly and the questions raised at its meetings, which are held once every quarter (and not always at that), are not solved promptly and properly.

"Railway tracks within the port require further development. It is necessary to carry out complete replacement of weighing equipment of the port and the station, but, unfortunately, this entire work is limited to correspondence.

"Solution of all these tasks will contribute to successful fulfillment of the plan and socialist pledges, which have been assumed by related enterprises of the Klaipeda transportation center in the 11th Five-Year Plan."

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PORTS AND TRANSSHIPMENT CENTERS

KALININGRAD PORT SEES IMPROVED PERFORMANCE IN 1984

Moscow MORSKOY FLOT in Russian No 12, Dec 84 pp 14-16

[Article by special correspondent G. Gol'shteyn: "Problems are Being Solved Slowly"]

[Excerpts] In issue No 12 of our journal for 1983 there was an article entitled "Developing Cooperation of Related Enterprises," which described the Kaliningrad transportation center that was established in 1978 on the basis of the maritime port. Included in it were the Kaliningrad-Sortirovochnaya Railway Station, the office of the V/O Soyuzvneshttrans [not further identified], the Western Shipping Company and the oblast motor transport administration.

For the purpose of coordinating planning and analyzing work of enterprises and organizations which are included in the transportation center, the Ministry of the Maritime Fleet, the USSR Ministry of Railways, the RSFSR Ministry of the River Fleet and the RSFSR Ministry of Motor Transport have developed and confirmed unified regulations on the transportation center, which came into force as of 1 January 1984.

Our correspondent has visited Kaliningrad again and familiarized himself with the work of related enterprises.

"In 1984, the Kaliningrad transportation center worked considerably better than in 1983," G. Sebov, chief economist of the port, described. "For the first time in the past several years, the plan for shipping imported goods from the port is being fulfilled every month in full volume. The static load per railcar has increased by 4 t and the railcar processing periods have been reduced. This has made it possible to conditionally release more than 2,300 railcars for the national economy.

"The fleet processing intensiveness has increased by 9.8 percent compared with 1983, the plan for cargo turnover in port has been overfulfilled by more than 3 percent and more than 35,000 t of cargo was transshipped above the plan according to the 'vessel-railcar' direct version."

"Special attention is being devoted to developing capacities of the transportation center," port chief engineer Ye. Gritsenya noted. "Since its organization more than R31.8 million in capital investments have been put into development of port facilities, 18 portal cranes and more than 180 intraport transportation vehicles have been put into operation, nearly 12,000 m² of storage areas have been built and crane and railway tracks have been modernized. Modernization of two deepwater berths has been completed. Construction of a refrigerated warehouse with an area of 4,000 m² has also been completed. An information and computer center has been put into operation."

Railway facilities have been further developed. The length of railway tracks in the port has increased by 2.5 km. A permanent ramp has been installed for simultaneous unloading of two covered railcars. Three Toyota automatic loaders have been equipped with railcar coupling for switching work and repair of railcars has been organized.

Collectives of the port and the port elevator have jointly fulfilled work aimed at speeding up processing of food cargo. Two transshipment complexes have been established on the basis of the elevator and their handling capacity has been increased to 45,000-50,000 t of grain per month against 20,000-30,000 t before modernization. Obsolete bunker installations have been replaced and existing ones have been modernized. The berths used for processing grain cargo have been improved.

Specialization of berths Nos 4 and 5 in unloading vessels with raw sugar and grain, which was conducted in the port, has justified itself. Capacities of the transshipment complexes have been strengthened. Three portal cranes with a lifting capacity of 10 t each have been installed here.

Organizational and technical measures, which have been implemented within the framework of the transportation center, have increased the capacity of berths by 20-30 percent. Improvement of the cargo processing technology is being continued. Transshipment of cellulose has been completely mechanized. Local shippers supply sack cargo only in a packaged form.

More efficient schemes of fastening metal and pipes in railcars, which made it possible to reduce the expenditure of fastening material 1.5-2 fold, have been introduced together with railwaymen; a technology of maximum loading of railcars for every type of bulk cargo has been developed.

Collectives of the Kaliningrad Port and the Kaliningrad-Sortirovochnaya Railway Station are linked by a unified cargo processing technology according to optimum correlated continuous plan-schedules. Socialist mutual assistance of related enterprises is being expanded on this basis. Here is one example. In 1984, by efficiently distributing cargo and using leading work methods, the port has been loading in every railcar an average of more than 54 t of cargo, including 59 t of grain and 60.6 t of sugar. This is the highest railcar loading indicator in ports located within the boundaries of the Baltic Railroad.

S. Goncharenko, deputy chief of the port for operations, believes that possibilities for increasing efficiency in utilization of railcars and vessels are far

from exhausted. "Not all reserves contained in continuous planning of transportation means processing have been put into operation so far," he noted. "Not all instances of above-norm layovers of vessels and railcars have been overcome, and there are deviations from the unified technological process. Even coordinated plan-schedules are violated sometimes. Means of communication and information are not being used to a sufficient degree."

Supervisors of the Baltic Railroad constantly assure us of their readiness to regularly supply the necessary number of railcars, but are not fulfilling their promises: the port has been systematically receiving less railcars from 1800 to 0800 hours. Railwaymen do not always provide prompt, reliable and complete information on the approach of rolling stock.

Discussions have been going on for years about the necessity of developing and introducing unified planning indicators for all participants of the transportation center, but there are none so far. Although plans are drawn up for supplying railcars and hauling cargo, it turns out that they do not have legal power. Specific culprits from related enterprises should be 'made to pay in rubles' for violating fulfillment of adopted plans. It is time to legalize the position that a cargo hauling plan is one of the basic work indicators of enterprises.

The port continues to receive a considerable quantity of import cargo in packages and containers. Its acceptance and transfer continues to be conducted according to obsolete norms (1958), which have been in need of a review for a long time. The plans for delivery of cargo for export in gondolas, on flatcars and in covered railcars do not correspond to the volume of imported cargo haulage. Therefore, it is necessary that the port's plans for export cargo for every type of railcar are made monthly. Only under this condition there will be a possibility for fully providing these cars for hauling imported goods.

Finally, it should be repeated again, it is time to legalize equal package hauling conditions for water and railway transportation. The possibility of dispatching packaged cargo with small damage must be found. It is precisely due to this reason that a large number of packages and containers in port are constantly separated manually, and the cargo has to be dispatched in covered railcars.

But all the same, who is supposed to solve these acute problems? Transportation centers, which operate on the basis of maritime ports, are united in regional transportation centers. But this, unfortunately, is far from an operational organ of management, it meets only four times a year and its decisions are of purely recommendatory nature. A meeting of the regional council, which was held in July 1983 in the city of Tallinn, discussed these problems of Kaliningrad workers. They discussed, adopted corresponding recommendation, but, as they say, the things are right where they started.

Coordination councils at all levels need certain legal rights, without which the best of recommendations are left hanging in the air or remain on paper.

As testified by information received by the editorial office, the problems of Kaliningrad transportation workers are also typical for other transportation centers of the country.

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PORTS AND TRANSSHIPMENT CENTERS

NEW TECHNOLOGY TO IMPROVE UKSSR RIVER PORT CAPABILITIES

Moscow VODNYY TRANSPORT in Russian 8 Jan 85 p 3

[Article by G. Zasimchuk, senior engineer in the ports department, UkSSR River Fleet Main Administration: "The Machine's New Profession"]

[Text] Ask any port worker: what is the most arduous, the most thankless operation in the loading and unloading process? Most will reply - cleaning out the remains of cargoes from railroad cars. Indeed, that is a tough job, and, if you will, dirty too. Just opening and closing the hatches on the cars takes a lot of time and muscle.

For many years now the production personnel, innovators and scientists of the country have been searching for ways to mechanize heavy manual labor. Some successes there are, but every port tackles the problem its own individual way. Here on the Dnepr the best results have been achieved by the river transport workers of Dnepropetrovsk. In collaboration with scientists from the local metallurgical institute they have spent years working on the creation of machines to cleanse railroad cars of the remains of dry cargoes. Several experimental models were developed, but each had some flaw. And now at last a mechanism has been assembled that will apparently satisfy everybody concerned and can be recommended for serial production. The machine is intended to clean out the residues of dry cargoes from cars after their unloading by clamshell cranes, tipovers and the like.

Its principal part is a cleaning device which is lowered into the gondola by a hoisting mechanism mounted on the machine's frame. During the machine's work stroke phase the load is gripped by cylindrical brushes and shunted down a guide trough into the mixer chamber of the nozzle. Here it is snapped up by a stream of compressed air from two high-pressure centrifugal ventilators and carried off into a bunker by way of a manifold. From the bunker it is ejected into a dump.

The creation of this unique cleaning machine was the result of creative collaboration between scientists and production people.

This collaboration helped resolve a number of other scientific and technical problems as well. For example, scientists from the "Ukrgiprorchtrans" institute and port engineers made a significant contribution to the development of continuous action mechanisms to handle loading and unloading operations. It is thanks to them that the ports now process 1.5 million tons of cargoes.

The continuous method of loading and unloading is applied, among others, to the processing of sand. The operation involves the use of hydraulic sandloaders with a capacity of 450-900 cubic meters per hour, conveyer loading machines and ER-25 rotary excavators. We would like to get some help from scientific organizations in the matter of broadening the applicability of this highly productive loading and unloading hardware in a manner consistent with the standards of today.

This is not to say that nothing is being done in this respect today. One of the enterprises of the RSFSR Ministry of the River Fleet has built an experimental model of a floating continuous-action conveyer transloader that handles 1500 tons an hour. Slated for construction in 1985-1986 is an experimental floating rotary-conveyer unloader of 1000 tons per hour capacity. It is to be built by the Kiev river port in creative collaboration with "Ukrgiprorchtrans".

Analysis of transloading equipment use in the ports of the UkSSR River Fleet Main Administration over the eleventh five-year plan period shows a slight rise in its productivity. The machinery's idle time (while under repair) was 0.5 percent less than in 1980, comprising 1.3 percent of its operational time.

The use of transloading equipment does, however, have its shortcomings. Thus, still unresolved is the problem of centralized production of spare and replacement parts for cranes, the manufacture of gripping devices and several less important ones. Our production personnel, working in conjunction with specialists from a number of sectorial institutes, came up with certain measures designed to lend greater reliability to port machinery. The turntable mechanism of the 10-ton "Albatross" cranes will soon be switched to Soviet electrical equipment, which is more dependable; the reduction gear in the portal cranes of the "Kirovets" and "Albatross" types will be modernized by providing their shafts with a sturdier design.

The collective of the Kiev river port have long-standing creative ties with the scientists of the Institute imeni Ye.O.Paton. One result of their collaboration is the assimilation of underwater welding by the port. This has led to a sharp increase in productivity on labor-intensive repair jobs, an equally substantial increase in the ships' operational time and to an array of other economic benefits. The portworkers of Kiev together with scientists of the UkSSR Academy of Sciences have created a liquid refuse

biological purification station. A similar station has been developed by the Project Design Bureau of the UkSSR River Fleet MA jointly with the Kiev Technological Institute of the Food Industry. A study has revealed that the biochemical method of purification leads to a sharp decline in the concentration of petroleum products in a ship's refuse liquids, as well as to an improvement in the sanitary-hygienic state of the water. Cleansing apparatuses have been developed for use aboard ships, dredgers and floating purification stations. These apparatuses allow waste liquids to be cleansed aboard the vessels themselves, thus avoiding the expense of collecting the sewage and transporting it to special onshore installations. The economic effect of exploiting these onboard purification apparatuses only on the 50 ships of the UkSSR River Fleet MA will comprise 25,000 rubles a year.

These are only a few of the facts that characterize the ongoing creative collaboration between scientists and river fleet workers. They witness to the effective development of scientific and technological progress in our industry.

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PORTS AND TRANSSHIPMENT CENTERS

LENINGRAD FLOOD CONTROL PROJECT PROGRESSES; ROAD TO KRONSHADT

Leningrad LENINGRADSKAYA PRAVDA in Russian 30 Dec 84 p 1

[LentASS report on meeting to mark damming of Gulf of Finland sector]

[Excerpts] Kronshadt, the city of Russian naval glory, finally has a land link with Leningrad. Yesterday saw the completion of an important stage in the construction of a complex to protect the city of Lenin from floods: the last link in a chain of stone-and-earth dams was put into place on the stretch between the island of Kotlin and the township of Gorskaya on the northern shore of the Gulf of Finland.

The First Secretary of the Leningrad CPSU Obkom L.N.Zaykov mounts the rostrum.

"Five years ago", he said, "the Central Committee of the party and the USSR Council of Ministers enacted a decree "On the construction of installations to protect Leningrad from floods". Carried out in that short space of time was a huge volume of hydrotechnical work. Suffice it to say that almost 200 million rubles' worth of capital investment was absorbed. A 14-kilometer-long stone-and-earth dam was erected with 18 million cubic meters of ground put into its body. A network of automobile roads and railway lines has been created. The job entailed a sharp rise in construction organizations' capacity and a substantial increase in the technical equipment of labor - put into commission was a concrete works and several sea wharves. Much has been done to improve the social and living conditions of the workers".

The meeting was addressed by USSR Minister of Power and Electrification P.S.Neporozhniy.

Speakers stressed that the construction of an all-weather road across the northern channel of the Neva inlet will now permit full-scale construction to unfold along the entire workfront. Slated for early completion is the giant foundation pit of the most complex installation of the entire project - the southern gateway for ships where the first concrete will be inserted in 1985. From

the Bronk landing on the southern shore construction will move relentlessly in the direction of Kotlin. And once again hard, heavy work will continue night and day, in any weather, and new meters and kilometers will be wrested from the sea.

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PORTS AND TRANSSHIPMENT CENTERS

BRIEFS

ILICHEVSK SHIPMENTS FOR CUBA--Ilichevsk (Odessa Oblast)--Every ship which is processed at the berths of the Ilichevsk port leaves for its run to Cuba ahead of schedule. Two motor ships, the Metallurg Kurako and the Iona Yakir, have both been dispatched at the same time ahead of schedule to the shores of our fraternal country. They are carrying about 25,000 tons of cargo. With the dispatch of these ships, the Black Sea Shipping Company has fulfilled its annual plan for Soviet-Cuban foreign trade shipments ahead of schedule. In order to reliably ensure this international line, in the Ilichevsk and Havana ports large-capacity specialized transshipment complexes have been created. The intensification of shipments is being promoted to a large extent by an international socialist competition between the seamen and longshoremen of both countries. In developing the successes they have achieved, the Ilichevsk port workers have planned to process by the end of the year about 100,000 tons of above-plan cargoes designated for Cuba, which is equal to the dispatch of an additional eight ships. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 16 Dec 84 p 1] 2959

MARITIME COMMO SATELLITE STATION--Odessa (TASS)--A maritime communications satellite station has gone into operation near Odessa. It will service Soviet and foreign ships operating in the waters of the Indian and Atlantic Oceans and equipped with special radio transmitters. The station, which is a part of the system of the International Maritime Satellite Organization (INMARSAT), will increase the effectiveness of the use of ships and their safety at sea. [Text] [Moscow VODNYI TRANSPORT in Russian 29 Dec 84 p 1] 2959

NADYM PORT EXPANSION--Nadym--A state commission has accepted for operations the second start-up complex of the Ob-Irtysh United Shipping Company's Nadym port. With the commissioning of the new capacities, the mechanized berthing front has been expanded by 200 meters, and four cranes, cargo areas and other facilities have been put into operation. [By a VODNYI TRANSPORT correspondent] [Text] [Moscow VODNYI TRANSPORT in Russian 29 Dec 84 p 1] 2959

PORT CRANES FROM GDR--(TASS)--With the assembly of two port cranes of the Sokol and Al'batros types, the collective of the Hoisting and Transportation Equipment Plant in the city of Eberswald (GDR) has completed the fulfillment of its annual plan for the production of output for the USSR. In all, the partners have been given a total of more than 90 cranes with various cargo capacities. By the end of the present five-year plan, the machine builders of Eberswald have committed themselves to a 1.5-fold increase in the amount of output they produce, chiefly port cranes with increased cargo capacity. A large amount of attention will also

be given to the further development of new, modern hoists. Among the plant's latest innovations is the Atlant crane, which is capable of lifting 60 tons of cargo. It has successfully undergone operational testing in the ports of the GDR and the Soviet Union. It is planned to put the first machines of this type into production as early as the beginning of next year. [Text] [Moscow VODNYI TRANSPORT in Russian 29 Dec 84 p 1] 2959

NEW YUZHNYI PORT COMPLEX--The first stage of an iron ore transshipment complex has been put into operation in the Black Sea's port of Yuzhnyy. More than 10 high-capacity port cranes, among which are 40-ton Sokols, have been mounted along an almost 400-meter-long berth. A powerful substation, a boiler room, a pumping station and a fire-fighting depot are in operation. Rail lines have been extended along the deepwater berth. Everything has been arranged so that losses of working time during loading and unloading operations are reduced to a minimum. The yearly transshipment capacity of the first stage of the new Yuzhnyy complex is 1.3 million tons of cargo. In 1985 it is planned to put the second stage into operation. [By journalist Ya. Levit] [Text] [Moscow VODNYI TRANSPORT in Russian 12 Jan 85 p 1] 2959

NEW RENI TRANSSHIPMENT COMPLEX--Reni--A sweep of the hand, and the boom of the port crane easily lifts a cargo consignment from the deck of the ship Yuriy Krymov. Having followed its course through the air, the packet is lowered onto the dock. This ordinary, everyday process has nevertheless given rise to applause from the longshoremen, railroad workers, construction workers and seamen. This is how the first stage of a large transshipment complex, built by the well known Yugoslavian construction firms Radno Mitrovich and Ivan Milutinovich, began its labor biography in the Reni Maritime Commercial Port. They were given great assistance by Soviet specialists. The commissioning of the transshipment complex will make it possible to process an additional 800,000 cargoes [sic] a year, and to dispatch 50 more railroad cars every day than in the past. Freight turnover in the second area of the port will almost double. [Text] [Moscow GUDOK in Russian 13 Jan 85 p 2] 2959

YUZHNYI PORT LASER BEACON--Odessa (TASS)--The confident conducting of ships to berths is being ensured by a laser beacon which has been installed in the range of the port of Yuzhnyy. Its beam began its work watch by laying out the route for the gas tanker Mossovet. The laser device is much more efficient than the traditional beacons: its beam can be seen in any weather. Installation of laser beacons is also being conducted in the ports of Belgorod-Dnestrovskiy, Kerch and Ust-Dunay. [Text] [Moscow VODNYI TRANSPORT in Russian 19 Jan 85 p 2] 2959.

PECHORA PORT WINTER OPERATIONS--(TASS)--Winter loading of vessels, which has begun in Pechora Port, will help in speeding up delivery of cargo via small rivers. Its precise pace is being ensured by a staff of fellow transport workers--rivermen, railwaymen and motor transport workers. Barges and boats have been prepared for the spring navigation season. This will make it possible to transport up to 500,000 t of cargo to hard-to-reach places during the brief high water period. [Text] [Moscow VODNYI TRANSPORT in Russian 29 Jan 85 p 1] 9817

MECHANIZED BERTH IN BENDERY--Bendery (TASS)--The Bendery River Port collective will speed up processing of vessels: a new mechanized berth was put into operation at its Varnitskiy cargo area. The share of the Varnitskiy area accounts for half of all cargo being processed in Dnestr ports. Grain, canned goods, mineral fertilizers, timber and building gravel are delivered here. Dockers, who have organized unified dispatching shifts with railwaymen of the Bendery Station, are forwarding a considerable quantity of them according to the direct vessel-rail-car process. With the commissioning of the new berth, port workers have been able to improve organization of work by accepting and forwarding various cargo simultaneously. This will make it possible to reduce the layovers of means of transportation. [Text] [Moscow GUDOK in Russian 1 Feb 85 p 2] 9817

ILICHEVSK YARD PRODUCING CONTAINERS--Ilichevsk (Odessa Oblast) 8 [Feb](TASS)--Containers, production of which has begun at the Ilichevsk Ship Repair Yard imeni 50-letiya SSSR, will make it possible to increase the volumes of cargo hauling on vessels. The first to take them on was the big-tonnage motorship "Geroi Monkada," which has left on a long voyage. Plant specialists were able to increase the carrying capacity of containers made of corrugated metal by one-fourth while preserving their former size and reducing weight. Vessels will now be able to haul an average of additional 3,000-5,000 t of cargo in one direction. This year, the enterprise will produce more than 5,000 containers. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 9 Feb 85 p 1] 9817

VENTSPILS MECHANIZED PORT COMPLEX--Ventspils (TASS)--The mechanized port complex for the transshipment of potash salt has reached its planned capacity--up to 7,000 t of fertilizers per day. All operations--unloading of special railcars, transporting potash salt to the storage warehouse and its delivery to motorship holds--are fully mechanized and automated and are conducted in enclosed galleries. "Several all-weather complexes were put into operation on Venta berths in the 11th Five-Year Plan," port chief Yu. Paderov said. "Transfer to vessels of petroleum products, chemical cargo and ammonia is carried out without the use of manual labor. As a result, the layover of motorships has been sharply reduced." [Text] [Moscow GUDOK in Russian 12 Feb 85 p 2] 9817

VANINO CONTAINER COMPLEX CONSTRUCTION--Vanino--Construction of a container complex has begun in Vanino Commercial Maritime Port. Builders of SMP-284 of the Dal'transstroy Trust [not further identified] are conducting preparatory work in the second cargo area. Tracks for assembly cranes are being built on the seventh berth. The complex will operate on the basis of the latest modern technology with the use of computers. Its design was prepared by the Dal'morniiprojekt [not further identified]. The new capacities of the port, to which tracks of the BAM [Baykal-Amur Mainline] extend, are planned to be put in operation in 1987. [By a VODNYI TRANSPORT correspondent] [Text] [Moscow VODNYI TRANSPORT in Russian 16 Feb 85 p 1] 9817

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EXPERIMENTAL SYSTEMS

PNEUMATICALLY POWERED VEHICLE R&D FOR REMOTE REGIONS

Moscow VOZDUSHNYY TRANSPORT in Russian 15 Dec 84 p 3

[Article by Professor V. Merkulov, doctor of physical and mathematical sciences, chief of hydrodynamic processes control lab, Institute of Theoretical and Applied Mechanics, Siberian Division, USSR Academy of Sciences: "Pneumatic Vehicle for Off-Road Conditions"]

[Text] Dear comrade editor! The 26th CPSU Congress called on Soviet scientists and engineers to develop fundamentally new types of transport vehicles. This is a problem of special interest to me, the nature of my work being such that I often have to visit the remote regions of our country, including the Far North, where the traditional means of transport are all too frequently ineffective. I would like to know through your paper what science is doing today in the matter of creating non-traditional means of transport.

Engineer B. Shishkin, Krustpils

What modes of transport do we know today? The airplane, the ship, the electric train, the automobile. That's about all. But what about tomorrow? What new machines will be carrying people and freight? This is something engineers and scientists are constantly thinking about and working at. The problem of freight haulage is especially acute in regions with no railroads or highways.

It is not by chance, therefore, that the "Basic Trends in the Economic and Social Development of the USSR for 1981-1985 and up to 1990" contain, in part, the following directives: "... create fundamentally new means of transport... extend their application to the haulage of freight in the northern regions of the country".

The expanses of Siberia contain huge deposits of valuable minerals. It is not enough, however, to extract them, they have to be moved out. To do that you need a well-developed network of roads. Swamps and permafrost take up 40-50 percent of the territory. River navigation lasts no more than 3-4 months in the year, even less on those that shallow quickly. Automobile roads, the so-called "zimniki" [winter roads] likewise have a short operational period.

The seasonal character of the North's transport system leads to delayed deliveries of cargoes, abnormally large accumulations of goods and a disproportionally large share of transportation expenses in the overall cost of commodities.

The absence of roads in Siberia significantly enhances the role of aviation. However, planes require capital airfields, while helicopters are limited in both range and weight-lifting capacity. The high cost of air haulage should also be borne in mind.

All this points to the need for a means of transport that would not be tied to the roads, not depend on the season of the year, could haul large-size freight and would be sufficiently cheap.

At first glance all these demands are met by the air-cushioned vehicle. The notion of replacing wheels with an air cushion was proposed by K. E. Tsiolkovskiy, the first man to devise a railroad where the cars sit on the embankment with the aid of a thin stratum of air. For such a support to be economically sound the air must have a smooth roadbed under it. But even more economical on a smooth roadbed are wheels clad in pneumatic tires which are really static air cushions.

The dynamic air cushion is a decidedly attractive proposition precisely because it has no need for a smooth roadbed and thereby makes the roadless vehicle feasible. However, the sizable clearance between the apparatus and the road surface necessary to negotiate irregularities on the ground immediately spawned a number of fundamental technical problems.

The first of these is the power needed to maintain pressure in the cushion. Let us compare, for example, the helicopter, where lift is created solely by its dynamic thrust, with existing air-cushioned apparatuses and with the automobile. The helicopter hoists and transports 4 kilograms of weight for every horsepower of its capacity. For the apparatus the figure is 10, and for the automobile - 50 kilograms. Obviously the air-cushioned vehicle still has a long way to go before it can rival the efficiency of the automobile.

The other drawbacks of the apparatus stem from the absence of contact with the surface. In such a machine thrust can be created only with the aid of an airscrew. Furthermore, non-contact with the surface precludes any reliable solution to the problem of stability and maneuverability. All this explains the difficulties encountered in the development of air-cushioned transport. Whatever successes in this field have been achieved in our country or abroad have to do solely with surface ships. The functional principle and power expenditure of existing air-cushioned vehicles allow them to be classified more as low-flying helicopters than anything else.

What could with far more justification be called an air cushion is the airtight inner tube which is capable of supporting a load without bringing any power into play.

Unlike the air-cushioned vehicle, the pneumatic tube retains contact with the surface, and this contact can be used to generate thrust. In fact, the traditional wheel with an inflated inner tube is an example of the pneumochamber which has both carrying capacity and thrust.

A reduction of pressure in such a wheel coupled with an increase in its size must lead to an increase in its practicability. However, the wheel has one organic drawback - when moving over sand, snow, mire, slush or swamps it tends to lose much of its grip on the roadway to the extent that if it hits a deep rut it may be incapable of overcoming the resistance and go into a skid. The same thing happens when negotiating tall obstacles or coming ashore out of the water. In addition to this organic shortcoming the low-pressure wheel has a number of engineering drawbacks as well. A heavy-duty truck must be equipped with 12-16 such wheels. To connect 2 or 4 of them to the transmission and driveshaft is possible, but that is not enough for good practicability. With all of them performing as drivewheels the vehicle becomes too complicated and, consequently, unreliable.

Low inner pressure, it would seem, exerts little strain on the material of the tube. However, this does not apply to the large-diameter wheel. It has been calculated that the tube will experience a surface tension of 500 kilogram-force per meter. Material so stretched is extremely vulnerable to all manner of contact, physical or otherwise.

The above shortcomings are inherent to caterpillar vehicles as well; they are lacking only in walking mechanisms. When a leg is brought forward it does not hit an obstacle, but steps over it, then pushes either down or back. The walking mechanism has a high degree of practicability, but the mechanical and logical complexity of its construction make the technical implementation of that advantage rather difficult.

However, a technical solution to the problem does exist - it is a walking mechanism with no automatic devices and with the most elementary kinematics, a "rotopede" created by the Czech engineer Yu. Matskerle. The very name of the apparatus which translated means "rotating legs" provides an adequate description of its design and modus operandi.

The so-called "legs" are actually airtight chambers made of a flexible material. 8 or 12 such chambers are mounted on a common hub. Air is fed through the hub's windows and hollow axle into the tubes positioned at the given moment behind the axle, and emitted

into the atmosphere from the chambers in front of the axle. In this way the front chambers bear down on an obstacle with no effort, and as the axle moves ahead, they fill up with air, thus generating a forward-directed lift and pushaway force. Such a work principle is in no way different from that of a walking mechanism.

The rotopede does not need a drive mechanism because it is itself a pneumatic engine wherein the energy of compressed air is transformed into work that turns and propels the wheel.

The inventor was not aiming for any particular level of practicability. However, the very principle of his apparatus can be used to create an all-terrain transport vehicle with a high degree of practicability.

The Institute of Theoretical and Applied Mechanics of the USSR Academy of Science's Siberian Division together with the Novosibirsk Electrotechnical Institute's Laboratory of Roadless Transport are currently working on the development of a transport vehicle that would drive equally well over wet ground, swamps, deep snow and open waters. The performance of experimental models convincingly demonstrates the effectiveness of the proposed design.

Those involved in the project dream of the time when a huge land or, to be more exact, an amphibious barge-pneumobile will effortlessly "swim" across a shallow or frozen river, come ashore and, crushing all the stumps, branches and tussocks it encounters, will confidently set "sail" across the vast expanses of Siberia. In addition to its own power facilities and the cargo being transported, the craft may be equipped with cabins for the crew, a kitchen, showers, a mess hall, in a word, everything needed for life and work a long way from home.

The economic efficiency of the pneumobile lends reality to the designers' dream. This vehicle is eagerly awaited by geologists and geophysicists, oilmen and pipeline builders, by all those who are today opening up the riches of Siberia.

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